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The Canadian Dental Hygienists Association

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JANUARY/FEBRUARY 2004

de l'Association canadienne des hygiénistes dentaires

VOLUME 38 NUMBER 1

60

Nutrition and Oral Health

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What's in a Name?

by Patty Wickstrom



"Registered Dental Hygienist..." Well, everyone understands the literal meaning of the term "dental hygiene" to be the "improvement of the health or the cleaning of teeth." So perhaps when the idea of dental hygienists in public health first began over 50 years ago in Canada, this was the perception of a dental hygienist as well. However, with the evolution of all aspects of oral health and the dental hygiene profession, the term now implies so much more. Education programs and standards of practice are continually being updated and expanded so the dental hygienists' knowledge base increases along with the scientific advances.

**We need to make our clients aware
of the full range of our expertise,
experience, and knowledge.**

When I first entered the oral health profession, it was as a dental therapist with the Saskatchewan Health Dental Plan. In explaining my path to becoming a dental hygienist, the question that came up most often was "What did you do as a dental therapist? Massage people's gums?" I would explain that the services provided by dental therapists were basic dental services (recall exams and prophylaxis, amalgams and composites on primary and permanent teeth, pulpotomies and stainless steel crowns on primary teeth) to children enrolled in the Saskatchewan plan.

Are we as dental hygienists now selling ourselves short? We are all aware of the full scope of services that dental hygienists provide and these are so much more than just "cleaning teeth." But does public recognize this? Does the public know what being registered means? CDHA's journal, *Probe*, has featured many articles in the past highlighting the relation between oral health and general health and the vital role that

Que veut dire un nom ?

par Patty Wickstrom

« Hygiéniste dentaire agréée... » Eh bien, tout le monde comprend que, dans son sens littéral, le terme « hygiène dentaire » signifie « amélioration de la santé ou nettoyage des dents ». Il y a plus de 50 ans, c'était aussi la perception qu'on avait de l'hygiéniste dentaire, lorsque ce concept apparut dans le domaine de la santé publique au Canada. Toutefois, avec l'évolution de tous les aspects de la santé buccale et de la profession d'hygiène dentaire, le terme a maintenant une extension beaucoup plus grande. Les programmes d'enseignement et les normes de pratique sont sans cesse mis à jour et élargis. De sorte que la base de connaissances des hygiénistes dentaires s'agrandit au rythme des progrès scientifiques.

À mon entrée dans la profession de la santé buccale, j'étais thérapeute dentaire à l'emploi du Régime de santé dentaire de la Saskatchewan. Lorsque j'expliquais le parcours suivi pour devenir hygiéniste dentaire, la question la plus fréquente était: « Que faisiez-vous comme thérapeute dentaire ? Des massages aux gencives de vos patients ? » J'expliquais alors que les services offerts par les thérapeutes dentaires étaient des services de base dispensés aux enfants inscrits au programme de la Saskatchewan, soit des examens de rappel et prophylaxie, amalgames et composites sur dents primaires et permanentes, pulpotomies et couronnes d'acier inoxydable sur dents primaires.

Comme hygiénistes dentaires, projetons-nous à l'heure actuelle une juste image de nous-mêmes ? Nous sommes toutes conscientes de la gamme complète des services que dispensent les hygiénistes dentaires, lesquels vont bien au-delà du simple « nettoyage de dents ». Mais le public le reconnaît-il ? Sait-il ce que veut dire le fait d'être agréé ? La revue *Probe* de l'ACHD a déjà publié de nombreux articles mettant en lumière la relation entre la santé buccale et la santé en général. On y a également souligné le rôle vital que les hygiénistes dentaires jouent en identifiant, en éduquant et en aidant ceux qui ont besoin de leurs services. Mais, peut-être, prêchons-nous dans la revue à des convertis ?

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QUE VEUT DIRE UN NOM ? ...suite à la page 13



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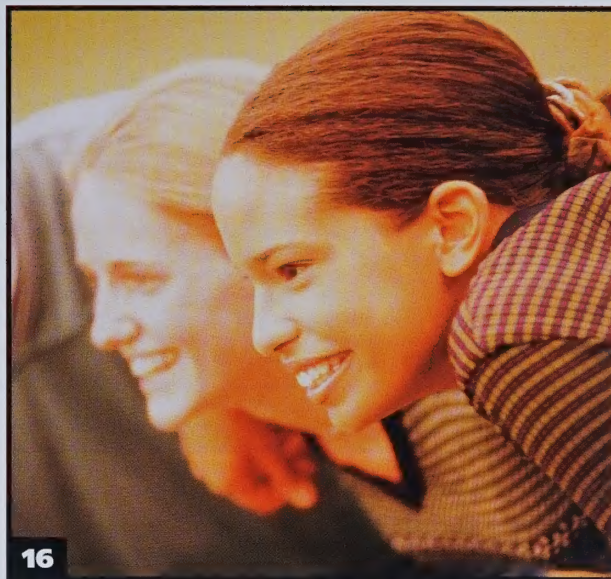
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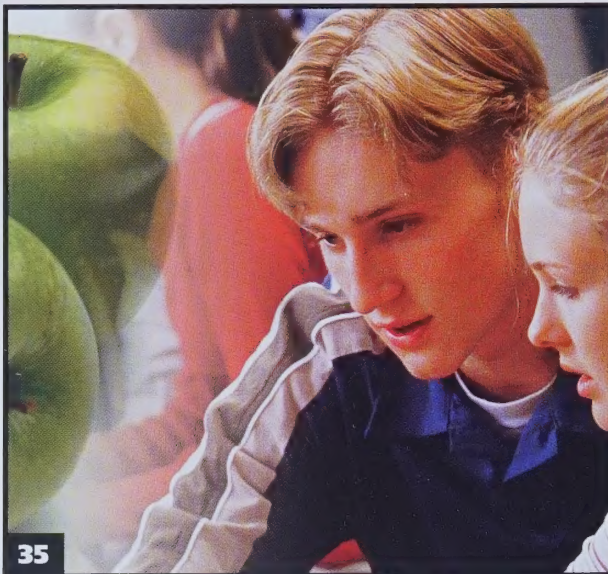
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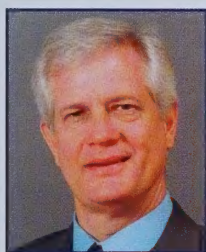


Dentin Hypersensitivity

Addressing a New Priority

Canadian Advisory Board on Dentin Hypersensitivity

The high prevalence of dentin hypersensitivity, combined with continued underreporting and underdiagnosis, has intensified the need to focus on the management of this condition. Responding to that need, the Canadian Advisory Board on Dentin Hypersensitivity, a committee representing a broad range of dental care specialties, convened to determine best-practice recommendations.¹ Collectively, they evaluated the scientific evidence as well as condition-related knowledge gaps that were identified by an extensive national survey of 8,000 dental professionals (7% response rate). By contributing their own diverse expertise, the committee produced the first ever "Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity" to provide direction to the dental care profession.



James R. Brookfield, DDS
Chair, Canadian
Advisory Board on
Dentin Hypersensitivity
Past President, Canadian
Dental Association

Many patients hesitate to open up. Dentin hypersensitivity may be more common than you think.

Often referred to as the "common cold of dentistry," dentin hypersensitivity is highly prevalent, affecting anywhere from 8 to 57% of the general population.¹ For patients who whiten their teeth, the occurrence can be even higher, reaching 75%.² Patients' lack of awareness and basic understanding about the condition has kept many from revealing their sensitivity during routine dental visits. Unless the pain is very troublesome, patients often hesitate to "bother" the dentist or hygienist with something patients think may be perceived as a minor complaint. Guilt over the possibility of unwittingly causing the pain themselves, or anxiety about the potential seriousness of the condition and its treatment, may also be keeping them quiet.

While detection sometimes occurs during routine examination, patient reticence highlights the importance of regular screening. However, the omission of dentin hypersensitivity from dental school curriculum and the absence of an established treatment protocol leave many dental professionals reluctant to pursue a diagnosis. Underreporting by patients, combined with an identified lack of knowledge and confidence on the part of the dental profession in effectively managing this condition, is leaving many patients suffering in silence.

Understanding the causes of dentin hypersensitivity reveals much about management and treatment.

Understanding the causes of dentin hypersensitivity reveals much about management and treatment.

The Canadian Advisory Board on Dentin Hypersensitivity defines dentin hypersensitivity as a short, sharp pain arising from exposed dentin in response to stimuli – typically thermal, evaporative, tactile, osmotic or chemical – which cannot be ascribed to any other form of dental defect or disease.¹ It is generally accepted that the dentin becomes exposed through either loss of enamel or gingival recession.¹

Enamel loss is most frequently caused by erosion due to dissolution by acids that are not of bacterial origin.¹ Dietary acids found in citrus fruits

and juices, wines and carbonated drinks are the most common causes. Heavy consumption of low pH soft drinks is considered a major factor of enamel erosion, and may explain why those as young as 5 or 6 have shown evidence of dentin exposure.³ Frequent vomiting due to bulimia is an example of how intrinsic acids may lead to enamel loss.

Acid initiates the softening and eroding of enamel. "Softened" enamel is susceptible to the effects of tooth brushing (with or without toothpaste), coarse diets and tooth grinding.¹ Therefore, while the forces of abrasion, attrition and abfraction can subsequently contribute to loss of enamel, erosion is the key to dentin tubule exposure.¹

Gingival recession is not well understood; however, over-zealous tooth-brushing, acute ulcerative gingivitis, self-inflicted injury and periodontal non-surgical and surgical procedures are recognized as predisposing factors.¹

Unless the factors that contribute to tooth wear or gingival recession are removed or reduced, pain is likely to return.¹ The challenge of modifying

patient behaviour underscores the need for ongoing management and treatment.

Underreporting and underdiagnosing highlight the need for diligent screening.

Dentin hypersensitivity can affect patients in a number of ways. It can compel them to avoid normal oral hygiene and eating behaviour, as well as regular dental appointments.^{2,4} The effect on patient behaviour, extensive prevalence, recurring pain, and multi-factorial aetiology all demand the attention of dental professionals.

Patients' silence emphasizes the need for dental professionals to screen diligently, initiate conversation about sensitive teeth, and provide patient education. A thorough understanding of the mechanisms of dentin hypersensitivity further highlights the importance of timely diagnosis, proper management and ongoing treatment strategies.

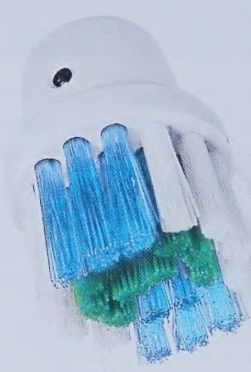
The Canadian Advisory Board on Dentin Hypersensitivity was supported by an unrestricted educational grant from GlaxoSmithKline Consumer Healthcare.



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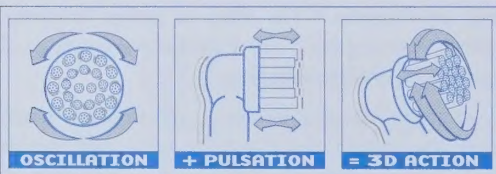


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¹ Heanue et al. Manual versus powered toothbrushing for oral health (Cochrane Review). In: The Cochrane Library, Issue 1, 2003, Oxford: Update Software.
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EXECUTIVE DIRECTOR'S MESSAGE

MESSAGE DE LA DIRECTRICE GÉNÉRALE

Eating, Oral Health, and General Health



by Susan Ziebarth, BSc, MHA, CHE

More people will die from hit-or-miss eating than from hit-and-run driving.

— Duncan Hines, in *Adventures in Good Eating* [n.d.]

Food is such a simple thing yet so heavily laden with values. We sustain, comfort, pleasure, and feed our bodies and souls by eating. This issue focuses on nutrition, a timing that is particularly appropriate as we have just emerged from the festive season and from making our New Year's resolutions. Unlike the many magazines this month that will trumpet the latest fad diet or miracle food, this issue concentrates on what you as an oral health professional can bring to your clients through your practice.

What do you, as a provider of health care, value in carrying out your profession? A clinical dental hygienist recently told me that she values the clinical outcomes she observes in her clients. She remarked that she would be disenchanted in her career if she relied upon positive client feedback. It is evidently rather rare for clients in a clinical setting to get out of the chair, tell her that she did a great job, and thank her for saving their teeth. This led me to wonder why this situation exists. Is it because the work of the dental hygienist during a clinical visit is often invisible to the client, or is it that the client does not really understand what is being done in the mouth? If this is the case, can you make an impact in an area where clients might be more readily relate to and understand? One such sphere could be counselling your clients on the impact of nutrition on their oral health.

You may be able to affect your clients' overall well-being by educating them about the link between their health behaviour and the oral health outcomes. Are your clinical clients aware that your depth of knowledge and professional expertise extends beyond the tactile experience that is their usual encounter with you? If the answer to the question is "yes"—

EATING, ORAL HEALTH, AND GENERAL HEALTH
...continued on page 42

L'alimentation, la santé buccale et l'état général de santé

par Susan Ziebarth, BSc, MHA, CHE

Plus de gens vont mourir d'avoir mal mangé que victimes d'un chauffard.

— Duncan Hines, dans *Adventures in Good Eating* [n.d.]

L'alimentation est tellement une chose simple, et pourtant, si chargée de valeurs. En mangeant, nous soutenons, réconfortons et nourrissons le corps et l'esprit, tout en leur plaisant. Ce numéro de *Probe* sur la nutrition arrive particulièrement au moment opportun, après la saison des Fêtes et les résolutions du Nouvel An. De nombreuses revues, ce mois-ci, mettront en vedette la dernière mode en matière de régime alimentaire ou d'aliment miracle. À l'inverse, on met l'accent dans nos pages sur ce que vous, comme professionnelles de l'hygiène dentaire, pouvez apporter à vos clients dans votre pratique.

À quelles valeurs tenez-vous, en qualité de dispensatrices de soins de santé, dans la pratique de votre profession? Une hygiéniste dentaire clinique me disait récemment qu'elle valorise les résultats cliniques visibles chez ses clients. Elle faisait remarquer qu'elle serait déçue de sa carrière si elle comptait sur la rétroaction positive des clients. Il est évidemment plutôt rare pour un client dans un milieu clinique de se lever de la chaise, de reconnaître l'excellent travail de l'hygiéniste et de la remercier pour lui avoir sauvé les dents. Je me suis alors interrogée sur le pourquoi d'une telle situation. Est-ce parce que le travail de l'hygiéniste dentaire pendant une visite clinique est souvent invisible aux yeux du client ou bien le client ne saisit-il pas vraiment le travail fait dans la bouche? Si tel est le cas, pouvez-vous avoir de l'impact dans un domaine où les clients pourraient être davantage prêts à établir des rapports et à comprendre? Une telle sphère d'activité pourrait consister à conseiller vos clients sur les répercussions de la nutrition sur la santé buccale.

**L'ALIMENTATION, LA SANTÉ BUCCALE
ET L'ÉTAT GÉNÉRAL DE SANTÉ ...suite à la page 42**

Nutrition and Dental Hygiene

by Linda Maschak*

10

How often in your practice have you been asked the following questions: "What kinds of food are good for my teeth? Are there any foods I should avoid so I don't have that calculus buildup? Is there anything that I can eat to make my gums healthier?"

How often do you incorporate dietary/nutritional relationships into your daily practice as a dental hygienist? As you carefully observe the colour, contour, texture, and consistency of gingival and other oral tissues, do you routinely consider how your client's dietary/ nutritional status may have an impact on what you're observing?

I must confess that many years ago when my son was about eight years old, I was quite taken aback when he asked me where my lip had gone! Looking critically in the mirror, I discovered that, yes indeed, I had "lost" about one-quarter of the colour of my upper lip near the lateral commissure. I rationalized that because I was "older," it was natural for the colour of my lips to fade and reluctantly resigned myself to using lip liner the rest of my life.

Months and months of continual colds and flu-like symptoms forced me to seek professional advice from my doctor. Blood tests indicated that I was anemic—this was quite a surprise since I had no lethargy or feelings of being tired.

I was initially quite embarrassed about not being able to figure out that I was anemic. Surely, as a dental hygienist, I should have made some nutritional links! I consoled myself knowing that the anemia is not due simply to a low intake of iron-rich foods.

This experience fired up my usual interest in pursuing nutrition knowledge. As well, about this time, I was invited to facilitate some nutrition classes at Vancouver Community College. Diverging a little, I should explain that my nutrition knowledge quest began while I was taking the prerequisite courses for dental hygiene. I was attracted to two programs, dental hygiene and nutritional sciences, and so applied to both. I was thrilled to be accepted into both programs and



after a great deal of thought, chose dental hygiene. Although I loved all aspects of dental hygiene, I still felt a need to further explore nutrition. Thus, five years after graduation, I became a full-time student in nutritional sciences. This experience left me with great respect for our colleagues in nutritional sciences—dietitians, nutritionists, biochemists, etc.—and for the education and internships that they undertake. Dental hygienists who choose to practise in alternative settings such as hospitals and residential care facilities are very

fortunate to be able to work within interdisciplinary health teams that include such nutrition professionals.

Regardless of our practice setting, dental hygienists need to keep current with nutrition research and policy that may affect the oral and general health of our clients. We need to ask ourselves, "When was the last time that I attended an interdisciplinary course or conference on nutrition? When did my study club last invite a guest speaker with a focus on nutrition or critically review research and policy papers on nutrition and oral health? When did I last review the Dietitians of Canada web site (www.dietitians.ca) or follow up on the latest reports regarding the collaborative American and Canadian scientific review of nutrient recommendations (Dietary Reference Intakes)?"¹

As dental hygiene students, we learn of the important relationships between nutrition and oral health and between eating habits and nutritional status. We also learn that the oral cavity is the "gateway" to the rest of the body in terms of both general health and nutritional status. Since the turnover of soft tissues in the "gateway" is more rapid than skin, we learn that oral soft tissues may reflect nutritional needs more quickly than other external body tissues and that we should carefully examine oral tissues for clues that may indicate a dietary/nutritional imbalance.

Reflecting on my opening questions, how many of you can confidently tell your clients what nutrients are essential for optimum continual health of oral hard and soft tissues? Using scientific evidence, are you able to list any foods that your clients should avoid in order to lessen dental calculus formation?

With the endorsement of four-year dental hygiene degree programs in the very near future, it is my sincere hope that nutrition education will be further emphasized throughout the curriculum. Dental hygienists need to clearly understand

* Linda Maschak, a 1974 graduate of the University of British Columbia, has been an instructor in the Dental Hygiene Program at Vancouver Community College for the past 16 years. Linda's previous contributions to CDHA's journal, *Probe*, include papers on treatment planning, quality assessment in continuing education, and ergonomics.

1. Health Canada Online: Healthy Living; Food & Nutrition; Office of Nutrition Policy and Promotion sections. (Cited November 24, 2003.) <www.hc-sc.gc.ca/english/index.html>

NUTRITION AND DENTAL HYGIENE ...continued on page 27

Long-term pain management tool?



NEW Canadian Consensus Report on dentin hypersensitivity recommends

a long-term approach to management, with desensitizing toothpaste as first-line treatment.[†]

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[†] Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity. Canadian Advisory Board on Dentin Hypersensitivity. *J Can Dent Assoc* 2003;69(4):221-226.

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The Canadian Dental Hygienists Association Elects a New President



October 25, 2003, Ottawa – The Canadian Dental Hygienists Association is pleased to announce that Patty Wickstrom was elected President of the Board of Directors.

Patty received a diploma in Dental Hygiene in 1987 and a diploma in Dental Therapy in 1982 from Wascana Institute of Applied Arts and Sciences

(WIAAS). Her work history includes 4 years with the Saskatchewan Dental Plan as a dental therapist and 16 years as a dental hygienist in private practice in British Columbia and currently in Alberta. Strong volunteer participation includes positions in the following areas: member of the 1996 CDHA Annual Professional Conference committee, four years as a councillor with the Alberta Dental Hygienists Association (ADHA), two years as President of the ADHA, a current position as junior representative of the International Federation of Dental Hygiene, as well as Past President of the ADHA.

What's New at CDHA

CDHA Launches a New Research Section on the Web Site

Visit this new area of the Members Only CDHA web site, to be found under *Research*, to see

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- Probing the Net

A New Research Agenda!

The CDHA Dental Hygiene Research Agenda was developed at the CDHA National Research Agenda workshop, held in May 2003 in Ottawa. The new Agenda identifies guiding principles, research topics, and recommendations for dental hygiene research in Canada. These recommendations for research are grouped within three main themes: the need to increase research capacity, the importance of knowledge dissemination at all levels, and enhancing research activity through collaboration and partnerships. Once in the *Members Only* section of the CDHA web site, click on *Research*, then *Past and Present Research Activity*, and then on the Agenda link to see the complete document.

Keep up to date with some important dental hygiene professional issues

New on CDHA's web site, Members Only section, are three information sheets on

- scaling education module for dental assistants;
- policy framework for dental hygiene education in Canada 2005;
- supply, demand, and need for dental hygienists across the country.

Once in the Members Only section, click on *Policy and Action*, then *CDHA in Action*, and look under the heading "Responses to Key Issues."

Directory of Researchers

The CDHA Directory of Researchers is under development. If you have conducted research that was published in a peer-reviewed journal, we would like to include your name in the Directory. Please send the following information to Judy Lux at jal@cdha.ca:

- name and contact information
- list of published research articles, including a full citation
- recommendations for future research

CDHA Board – Highlights of Meeting

October 25, 2003, Ottawa – The CDHA Board of Directors, under the coaching of Jannice Moore, reviewed and amended the Ends, Governance, Executive Limitations, and Board-Executive Director Linkage Policies. The Priorities Ends Policy was rescinded as priorities are now incorporated into the Mission and Purpose Ends Policy. (The complete Mission/Purpose Ends Statement can be viewed on-line on the CDHA web site at www.cdha.ca, *Members Only* section, *CDHA Priorities* area, under *Inside CDHA*.)

The Board welcomed Dominique Derome as the FDHRA representative, replacing Charlene Hamill.

The Board accepted the *CDHA Dental Hygiene Research Agenda*. This document is available on-line in the *Members Only* section, under *Research*, *Past and Present Research Activity*. The Board also accepted *Questions and Answers Documents on Dental Hygiene Education; Scaling Module for Dental Assisting; and Dental Hygiene Supply, Demand, and Need*. These are also available on-line in the *Members Only* section, *CDHA in Action*.

The Board agreed that CDHA will prepare a bid for the 2010 IFDH Symposium.

Diane Thériault was acclaimed as CDHA's President-Elect.

The Board agreed to extend the term of office for the current President, Patty Wickstrom, to March 2005 in order to align the presidential term with the board of directors' terms so that the changeover will be in March 2005.

CDHA Distinguished Service Award and Life Membership

The **CDHA Distinguished Service Award** recognizes significant contributions for a minimum of four years by a dental hygienist or other person to the advancement of the dental hygiene profession or of CDHA at the national level.

The nominee's contribution may include, but is not limited to, work on a task force, committee, or innovative project. The service must have been national in focus, made a positive impact on the profession, and involved a substantial amount of personal commitment on behalf of the recipient.

CDHA Life Membership is awarded to an active member, in good standing, of the Canadian Dental Hygienists Association who has made an outstanding contribution to both dental hygiene and the association at the national level.

Dental hygienists nominated for Life Membership shall fulfill the following qualifications:

1. They will have maintained continuous CDHA membership in the active category for a minimum of 15 years.
2. They will have been involved in dental hygiene at the national level and in an official capacity for a minimum of 10 years.
3. They will have made a significant contribution to the growth and achievement of the national association, compared with others involved for the same length of time and in similar capacities.

For nominations to be considered by CDHA, we require the written support of two CDHA members in good standing. Nominators may submit only one nomination for this award.

Submissions must be accompanied by a detailed curriculum vitae of the individual being nominated, as well as an outline of accomplishments at the national level that the nominators consider worth of this award.

Life Membership will be bestowed during CDHA's 15th Annual Professional Conference in St. John's, Newfoundland and Labrador, in June 2004. The Board of Directors will designate Distinguished Service Award recipients and Life Members at the Board meeting in February 2004. It would therefore be appreciated if you would submit your recommendations no later than February 4, 2004. Submissions should be sent to the Canadian Dental Hygienists Association, 96 Centrepointhe Drive, Ottawa, ON K2G 6B1. 

CDHA Defends the Profession

CDHA presents the Association's understanding of certain "problems" outlined in a Canadian Dental Association document, "Dental Hygiene Key Messages." The areas addressed include the current supply of dental hygienists, service delivery models, hygienists' qualifications and long-term relationships with clients, the role of dental hygienists in underserved areas, perceived fragmentation of care, and scaling modules for dental assistants. To see the full document, go to the *Members Only* section of the CDHA web site (www.cdha.ca). Click on *Policy and Action*, then *CDHA in Action*, and look under the heading "Responses to Key Issues."

"QUE VEUT DIRE UN NOM ?" (suite de la page 3)

savoir. Il est évident que le counselling en hygiène dentaire est une partie importante de notre travail. Il y a toutefois de nombreux autres domaines dans lesquels nous pouvons conseiller sur les façons de mener un style de vie plus sain. Nous donnons de l'information sur les dangers du tabagisme, ses répercussions sur la vie et les divers programmes pour cesser de fumer et obtenir du soutien. Nous pouvons également reconnaître les indices de la toxicomanie (drogues et alcool) par l'état de la cavité buccale et de tout le corps, et ensuite diriger nos clients vers l'intervenant ou l'organisme approprié. En étant attentives et sensibles à l'apparence générale ainsi qu'au comportement d'un client, l'hygiéniste dentaire peut soupçonner l'abus — enfant, conjoint, conjointe ou aîné — et aiguiller une personne pour évaluation et intervention possible vers des groupes de soutien ou des organismes locaux.

D'autres visiteurs à nos bureaux viennent y solliciter des suggestions et des conseils relatifs aux options de traitement; ou désirent simplement une oreille objective pour leurs problèmes, parfois reliés ou non à la santé buccale.

Devant des clients aussi attentifs, nous avons l'occasion parfaite de mettre en valeur notre profession et de les sensibiliser au fait qu'en réalité nous faisons davantage que

du « nettoyage de dents ». Participer aux programmes d'éducation permanente, lire des revues professionnelles et profiter de la multitude de ressources disponibles sur Internet, voilà autant de façons de nous éduquer sur les nombreux aspects de l'hygiène dentaire, strictement thérapeutiques ou reliés au counselling. Nous pouvons alors transmettre ces renseignements à nos clients et au public. L'actuel numéro de *Probe* contient de précieux renseignements sur le lien existant entre le régime alimentaire, la santé buccale et la santé en général. Cette information nous permettra ainsi d'aider nos clients à choisir les aliments qui leur conviennent le mieux à cet égard.

Alors, se peut-il que l'appellation « hygiéniste dentaire agréée » ne soit pas suffisamment englobante. Peut-être devrions-nous avoir l'audace de changer notre titre en celui d'« expertes en santé buccale »! Fort probablement, il vaut mieux pour nous d'éduquer le public sur qui nous sommes et sur ce que nous faisons. Et ensuite, de surveiller l'évolution de l'hygiène dentaire.

On peut contacter Patty Wickstrom à l'adresse president@cdha.ca. 

Healthy Eating

Is Essential for

Healthy Teeth

in Young Children

by Lynn Roblin,* MSc, Registered Dietitian



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Eating well during the formative early childhood years is essential to the development of healthy teeth. Consuming a well-balanced diet with adequate nutrients is a crucial first step in the lifelong process of maintaining healthy teeth. Throughout infancy and early childhood, some eating behaviours and food choices increase the risk of dental caries. Helping parents and caregivers understand the important role they play in helping children establish healthy dental habits early in life is paramount.



A well-balanced diet that's high in essential nutrients, including calcium, phosphorus, magnesium, and fluoride, is required to develop and maintain healthy teeth.¹ The best source of calcium is dairy products such as milk, cheese, and yogurt. Other sources include calcium-fortified soy and rice beverages and orange juice, tofu fortified with calcium, canned salmon and sardines, cooked beans, and almonds. Phosphorus and magnesium are found in milk products, beans and

lentils, nuts and seeds and in smaller amounts in many other foods. Fluoride is provided in many municipal water supplies and foods processed, grown, or cooked in it. Fluoride continues to be the cornerstone of dental caries prevention in North America and throughout the world.^{2,3}

Dental caries is a common, chronic disease of childhood. High-risk children include those with early signs of early childhood caries, poor oral hygiene, limited exposure to fluorides, and frequent exposure to sugary snacks and drinks.⁴

Baby bottle syndrome has frequently been cited as a cause of dental caries in children.⁵ This practice includes giving a bottle of sugar-containing beverages during sleep time or to pacify an infant, bottle feeding past 12 months of age, and the use of sweetened pacifiers. These practices increase exposure to cariogenic carbohydrates. Children at highest risk of dental caries as a result of baby bottle syndrome are those from low socio-economic families.⁶ Parents need to be

advised to avoid putting sugary drinks in baby bottles or sippy cups and to discourage the behaviour of putting a child down to sleep with a bottle.

Some evidence suggests that contemporary changes in beverage patterns, particularly decreased milk consumption and increased intakes of regular pop and powdered beverages, and to a lesser extent, 100% juice, is linked to increased caries risk.⁷ Fruit juices contain 100% fruit and provide essential nutrients but they as well as other sugary drinks can contribute to dental caries. Fruit drinks, bottled or made from powders, are mostly sugar and water. They do not contain very much fruit juice and do not provide the vitamins and minerals children need. Soda pop provides no nutrients and is not recommended as part of a healthy diet for preschoolers. Parents should be encouraged to adhere to current dietary guidelines for children, which recommend 2–3 servings of milk products daily, limiting intake of 100% juice to 4 to 6 oz. daily, and restricting other sugared beverages to occasional use.

Snacking is a common practice for young children and is necessary to help them get the energy and nutrients they need each day. However, it is important to choose foods that won't contribute to dental caries. Snacks high in sugar or carbohydrates can cause cavities, especially if exposed to the teeth frequently or for prolonged periods of time.⁸ For example, eating candies or dried fruit for snacks when there is less saliva present or continuous sipping on sugary drinks are habits that increase the risk of dental caries. Other factors—including the presence of buffers in dairy products and consuming sugars as part of meals rather than between meals—may reduce caries development.⁹

As preventive strategies, parents should be advised to limit their child's snacks to two to three per day. Parents should also set regular meal and snack times and discourage day-long nibbling on food or sipping beverages. Snacks containing sugar that are slowly eaten such as candy, cough drops, lollipops, and suckers should be limited. Sticky, sweet foods such as dried fruit and candy should also be avoided as snacks unless children can brush their teeth right after. Snacks should include nutritious foods from at least two of

*Lynn Roblin is a registered dietitian and freelance nutrition writer and consultant. She is currently coordinator of Healthy Start for Life, a project designed to promote healthy eating and physical activity among toddlers and preschoolers. This project is sponsored by Dietitians of Canada in collaboration with nine child care and health agencies. The project is funded through Health Canada's Population Health Fund. Lynn can be reached at <lroblin@marketlinksolutions.com>.

the four food groups mentioned in *Canada's Food Guide to Healthy Eating*. Healthy snack choices include whole grain breads, bagels and muffins, low-sugar cereals, fruit (except dried fruit), vegetables, unsweetened 100% fruit juice, milk, cheese, yogurt, yogurt and fruit smoothies, cold cuts (ham, turkey, roast beef), cooked eggs, and peanut butter. Nuts are dentally acceptable but should be avoided in young children because of the risk of choking.

Oral hygiene including regular tooth brushing is fundamental for promoting healthy teeth and preventing dental caries. Because many young children are not able to brush their teeth properly, parents and caregivers should be advised to continue brushing their child's teeth as long as possible. Surveys show that tooth decay in young children is becoming concentrated in more deprived sectors of the population.¹⁰ It is therefore extremely important to pay close attention to families with young children in underprivileged areas and to provide them with the information and advice they need to improve their dental health.

Patterns of dental health behaviour are established early in children's lives, and parents and caregivers can make a difference in the development of healthy teeth in their children. Dental hygienists are in a unique position to support dentists and dietitians in providing preventive guidance to parents and caregivers of young children.

For more information on promoting healthy lifestyle habits in children including healthy eating and active living, visit *Healthy Start for Life* at <www.dietitians.ca/healthystart>. This web site provides helpful resources for parents and caregivers including a meal planner and recipes, an activity planner and activity ideas, FAQs, an online course, and resource inventory.

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*Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity. Canadian Advisory Board on Dentin Hypersensitivity. *J Can Dent Assoc* 2003;69(4):221-6.

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Adolescent Diets and Oral Health

by Charlene Chen,*
BSc, RD, CNSD



Ever wonder what average teens are eating these days? The teenage years mark the onset of multiple physiological and psychological changes, making it an interesting yet confusing time for the teens. Making proper food choices during this developing time can have an important impact on the teen's health. Obesity-related diseases and eating disorders are two ends of the spectrum, both afflicting this susceptible population, many times giving rise to popular fad diets. These affluent diseases and resultant fad diets can take their toll on the body over time, including oral health. This article's main objective is to examine the relationship between adolescent dietary habits—including a few popular fad diets—and their impact on oral health. By increasing their knowledge of diet trends and the resulting effects on their teen clients' oral health, dental hygienists have an opportunity to enhance the overall health of this susceptible population. Simple healthy eating information can be given at the chair side as needed. Trigger questions have been provided in this article to help the dental professional screen clients with possible eating disorders and poor eating habits.

* Charlene Chen is a Registered Dietitian working at Vancouver General Hospital, a tertiary teaching hospital in British Columbia. Charlene graduated from the University of British Columbia and completed her internship at St. Michael's Hospital in Toronto. She is an advanced clinician with broadly based experiences in rehabilitation and geriatric medicine, surgical and critical care areas. Charlene is also interested in consumer issues, is a designated media spokesperson for the Dietitians of Canada Association, contributes regularly to Canadian magazines such as *Chatelaine* and *Glow*, and has appeared on TV and local radio shows. Charlene can be contacted at <cchen@vanhosp.bc.ca>.

Physiological development of the adolescent

Adolescence marks the transition from childhood to adulthood. It is a time of dramatic physical and psychological change. Adolescence is also a dynamic period in life when many lifelong health-related behaviours are established, including dietary habits, exercise patterns, and interactions with the health care system.

Puberty ushers in dramatic changes in multiple hormonal systems, including alterations in adrenal steroid production, maturation of the reproductive system, and increased production and action of the growth hormone. Appetite increases in association with growth spurts, and sleep patterns change with a tendency to stay up later and a desire to sleep later into the day.

In terms of health problems, adolescence is generally a healthy period and is often accompanied by a feeling of immortality, which leads to risk-taking. When diseases of childhood or the consequences of their treatment extend into adolescence, or when disease strikes during adolescence, the sense of unfairness may be overwhelming. Anger and denial can lead to poor compliance with therapeutic regimes.¹

Many adolescents have voracious appetites in response to the energy and caloric requirements generated by growth spurts. The unique physical, psychological, and social transitions of adolescence provide a context for the development and perpetuation of eating patterns. Based on the NHANES (National Health and Nutrition Examination Survey) III survey for 1988 to 1994, there was evidence of a 6% increase in overweight teenagers over the previous decade.² The increasing prevalence of obesity is multifactorial and involves patterns of eating behaviour as well as alterations in

activity level. Physical activity among both boys and girls tends to decline steadily during adolescence.¹

Psychological development of the adolescent

The adolescent years are characterized by the many psychological changes, including the development of abstract thinking, greater independence from family, the formation of a personal and sexual identity, the establishment of a value system, and an increase in socialization.

Some common psychiatric and behavioural disorders include depression, substance abuse, antisocial behaviour, excessive risk-taking, and eating disorders.

Adolescent eating disorders

Eating disorders such as anorexia nervosa or bulimia often have their onset during adolescence. Control over dietary intake is perhaps one of the first mechanisms that adolescents use to establish autonomy and achieve independence from family. The majority of female teenagers and young adults in western cultures report feeling discontented with their body shape. Surveys of the normal teenage population report a high frequency of dieting and abnormal eating patterns; for example, up to 79% binge, 70% consider themselves fat, 11% induce vomiting, 5% abuse laxatives, and about 3% meet diagnostic criteria for anorexia or bulimia nervosa.¹

The two major eating disorders are found almost exclusively in adolescent girls and young women. The typical person with anorexia nervosa becomes pathologically afraid of gaining weight and reduces her food intake so severely that she may die of starvation and electrolyte disturbances. It is not known whether the cause of anorexia nervosa is primarily psychological or biological. There are many other abnormalities associated with this disorder—loss of menstrual periods, low blood pressure, low body temperature, altered secretion of many hormones.¹

Bulimia is recurrent episodes of binge eating. It is associated with regular self-induced vomiting and usage of laxatives and diuretics as well as strict dieting, fasting, or vigorous exercise to prevent weight gain. Bulimics are generally within 10% of their ideal body weight.² Many bulimics are able to hide their bingeing and purging with families and friends not knowing of their disease for years on end.

Eating disorders and oral health

In the case of bulimia, repeated vomiting can severely erode tooth enamel and over time, teeth will become worn and translucent. The mouth, throat, and salivary glands may become swollen and bad breath may result.

Each of these two disorders robs the body of adequate minerals, vitamins, protein, and other nutrients needed for good health, causing potential injury to teeth, muscles, and major organs.

Some common diet trends

Eating a well-balanced diet is more and more of a challenge these days, given that modern society is fast-paced compared with previous decades. The modern lifestyle and the two-income family often means that parents are not cooking meals at home as often, and fast food and convenience foods are more readily consumed. Nutrition is yet to be taught in most schools as a curriculum of survival skills and teens are often left to their own devices when making food choices. Coupled with media influences such as fashion magazines and televisions, the situation can be ripe for teens to test out fad diets in an attempt to assert independence and control over their bodies.

Here are some common diet trends, including a few fad diets prevalent in the media today, and the effects that these diets may have on the teen's oral health.

High-protein, low-carbohydrate diet

Diets such as Dr. Atkins' New Diet Revolution, the Zone diet, and the 30-day Low-Carb Diet Solution promise rapid weight loss and steadying of blood sugars, while dieters can eat as much fat and protein as they desire. These diets blame high insulin levels and malfunctioning metabolic systems for most weight problems. Their suggestion is to restrict carbohydrate consumption initially to no more than 20–30 grams a day, while enjoying unlimited amounts of meat, poultry, fish and eggs, nuts, seeds, oils, and some non-starchy vegetables such as spinach and lettuce. The Zone Diet has a milder carbohydrate restriction but all these diets restrict carbohydrates such as bread, pasta, cereals, and sugars. An example of 15 grams of carbohydrates is a slice of bread or half a cup of cooked rice.^{3,4,5}

While people do lose weight rapidly in the initial phases of this diet, much of the loss can be attributed to the water loss as well. The lack of variety in the diets could make long-term adherence difficult, as well as causing vitamin and mineral deficiencies if the diet is not supplemented correctly. Several such nutrients are vitamin D and calcium that are necessary for bone and tooth formation, and folate that is important for women considering pregnancy. The diets are also low in fibre.

Here is an example of a typical high-protein diet:

BREAKFAST	<i>Bacon and eggs (no toast, no juice)</i>
LUNCH	<i>Small salad and double cheeseburger (no bun)</i>
DINNER	<i>Steak or fried chicken with salad topped with cheese dressing</i>

Recent short-term studies suggest that the Atkins Diet may be less harmful and more beneficial than supposed. It leads to a faster weight loss initially than the conventional low fat diets. A further long-term study is underway and should help to clarify the health and safety of the Atkins Diet.

The general consensus among nutrition professionals is that these diets are unbalanced and high in saturated fat and cholesterol, which can increase the risk of heart disease and overwork the kidneys. Constipation, headaches, nausea, and dehydration may be some expected side-effects as well.

Due to the low carbohydrate and sugar content of these diets, one can safely deduce that the cavity-causing ingredient of sugar is low and that the low acidities of the protein foods create a good environment for teeth and oral health, if one supplements these diets with the appropriate calcium, vitamin D, folate, and vitamin C. Otherwise, one can expect gum problems due to a lack of vitamin C with the dearth of fruits and vegetables in the diet, as well as teeth problems with a lack of calcium in the diet.

Raw-food diets

Raw-food diets such as the Caveman Diet and the Hallelujah Diet are based on the premise that if one eats like one's ancestors, one will feel healthy and energized, the risk of illness will be decreased, and one will lose weight. The diets promise to cure eating disorders and decrease fat production in the body. Advocates of the diet suggest that heat and acid production during the cooking process alters the food and destroys the enzymes, making nutrients unusable by the body. The diets recommend a mostly vegan diet, with protein sources being raw nuts and seeds and sprouts. Most raw-food diets suggest eating at least 75% of one's food raw; the strict versions insist on 100% raw; and some suggest eating only fruits or juices. None of the groups allow dairy products, eggs, or meat.^{6,7}

While these diets are rich in fruits and vegetables, vitamins and minerals, fibre and antioxidants, they are low in calcium, vitamins B12 and D, zinc, protein, and calories. Preparation of raw food can take a lot of time, and malnutrition has often been reported for prolonged dieting on raw foods. Cooking makes certain animal protein foods easier to digest and absorb, kills certain bacteria, and makes for food safety, a necessary part of healthy eating. This diet is not supported by any scientific evidence since most fruit and vegetable enzymes are inactivated once entered into the human stomach.

In terms of oral health, calcium and vitamin D are needed to strengthen teeth throughout life. A diet such as the raw-food diet is low in calcium and vitamin D, which can lead to osteoporosis and tooth/gum disease. Teeth may soften when there is a shortage of vitamin D and become more susceptible to decay and periodontal disease.

Vegetarian diets

A conventional vegetarian diet is defined as one that does not include meat, fish, or poultry. It is the position of the American Dietetic Association and the Dietitians of Canada that appropriately planned vegetarian diets are healthy, nutritionally adequate, and provide health benefits in the prevention and treatment of certain diseases.⁸ Interest in vegetarianism appears to be increasing, with many restaurants and college food services offering vegetarian meals routinely. Sales of vegetarian foods have appeared in many supermarkets as well.

A vegetarian, including vegan, diet can meet the current recommendation for all of these nutrients. In some cases, use of fortified foods or supplements can be helpful in meeting the needs for individual nutrients. Well-planned vegan and other types of vegetarian diets are appropriate for all stages

of the life cycle, including adolescence. Vegetarian diets offer a number of nutritional benefits including lower levels of saturated fat, cholesterol, and animal protein as well as higher levels of carbohydrates, fibre, magnesium, folate, antioxidants such as vitamin C and E, and phytochemicals. Most vegetarians eat milk products and eggs, and as a group, these lacto-ovo-vegetarians enjoy excellent health. Vegetarian adolescents are reported to consume more fibre, iron, folate, vitamins A and C than do non-vegetarians. Vegetarian adolescents also consume more fruits and vegetables and fewer sweets, fast foods, and salty snacks compared with non-vegetarian adolescents. Key nutrients for adolescent vegetarians include calcium, vitamins B12 and D, iron, and zinc.

Vegetarian diets are somewhat more common among adolescents with eating disorders than in the general adolescent population. However, recent data suggest that adopting a vegetarian diet does not lead to eating disorders; rather, vegetarian diets may be selected to camouflage an existing eating disorder.⁸ With guidance in meal planning, vegetarian diets are appropriate and healthful choices for adolescents.

Again, in terms of oral health, an improperly planned vegetarian diet can lead to a deficiency in calcium and vitamin D, amongst the nutrients listed above, and can contribute to weak teeth, periodontal diseases, and poor bone health.

Crash diets

Crash dieting can affect more than one's figure and deserves a mention in this article. Teens and adults have been known to start crash diets without ever realizing that this may in fact be the incorrect way to diet. These crash dieters who fast excessively or diet on and off tend to have a lack of, or decrease in, certain vitamins, most notably vitamins D and B12, and calcium. They also tend to lack certain minerals and proteins in their diets.

These are important vitamins for the health of teeth and gums. What can occur is that dieters tend to have a diet high in fruits that may contain a high content of natural sugars. These sugars tend to decay and erode the enamel of the teeth. Dieters also tend to take diet pills that may cause a decrease in saliva flow as a side effect. This decrease in saliva flow tends to increase the acid levels in the mouth, which may cause an increase in cavity formation.

Crash diets and yo-yo dieting can also be harmful to the body's natural metabolic rhythms and can end up slowing down one's metabolism, leading to unwanted weight gain even on small amounts of food. It is recommended that dieters consult with their physician and a dietitian to determine what are the pros and cons are for each type of diet being considered and to understand the long-term implications of these diets.

Fast food diets

Fast foods restaurants are very popular with the teen population due to their convenience, low cost, and taste appeal. However, convenience foods can usually add up to an excess intake of calories and soft drinks. By adding a large french fries and a medium soft drink to a cheeseburger, a meal can

add up to 1,000 calories or more, which can be half of a 125-lb. teenager's daily recommended intake.⁹ Tips for the teen: Do not "supersize" orders in fast food restaurants; get the smallest portion of fries; and ask for water to drink with the meal if possible.

Luckily, some fast food chains are coming out with healthier alternatives that are lower in fat and calories. Frequent eating of high-fat foods and large portions coupled with a sedentary lifestyle is the quickest way to obesity and its related diseases.

Snacking

The more frequently food passes through one's mouth, the more opportunity bacteria have to produce plaque by using these raw materials. Bacteria love sugar and starches, as mentioned. When one doesn't clean one's teeth after eating, plaque bacteria use the sugar and starch to produce acids that can destroy the tooth enamel.

Eating patterns and food choices among teens are important factors that affect how quickly youngsters develop tooth decay. When plaque bacteria on the teeth come into contact with sugar or starch in the mouth, acid is produced that attacks the teeth for 20 minutes or more and that can eventually result in tooth decay.

Due to the increased appetite of average teenagers during growth spurts, snacking is sometimes unavoidable and beneficial in providing small amounts of fuel throughout the day. However, certain types of snacks are more nutritious and less damaging to the teeth than others and will be covered in the next section.

Soft drink woes

Diet plays a key role in the development of dental caries, especially in the consumption of sugar and refined carbohydrates. There are two major disadvantages to drinking soft drinks. First, they take the place of milk and dairy products in the diet and thus calcium intake is reduced. Second, increased sugar in the diet increases the risk of tooth decay. Some soft drinks contain 11 teaspoons of sugar per serving and many soft drinks contain phosphoric or citric acid. Studies have shown the acid in these soft drinks may also increase enamel erosion.

The United States Department of Agriculture (USDA) reports "poor dietary habits of children could increase their risk for adulthood diseases such as hypertension, stroke, diabetes, osteoporosis and others."¹⁰ Food choices generally affect one's overall health, including the teeth and gums. There is growing concern among America's dentists that many of their patients are consuming record numbers of sugar-filled sodas, sweetened fruit drinks, and non-nutritious snack foods and it is reported that "teens are drinking twice as much soda pop as milk."¹⁰ These items should be limited so that other health foods are not crowded out of the daily diet, such as dairy products.

The National Soft Drink Association reports that the average man, woman, and child in the United States consumes 56 gallons of soft drinks a year! The USDA reports "thirty-five percent of snacks and low-nutrition beverages consumed by



Adolescence is a growing time when learning to eat properly can lead to lifelong health benefits.

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children are obtained at school or from fast-food establishments."¹⁰ Parents may want to consider working with other parents, school authorities, and dietitians/nutritionists to control what is being sold from school vending machines and in cafeterias. Parents should also limit the amount of high-sugar drinks at home. Also, one can help the teen to develop a habit of carrying around a water bottle to rinse their mouth after a meal or snacking if brushing is not convenient or possible. If sugary drinks are desired, try limiting them to mealtimes since they are less harmful when eaten in combination with other foods.

What should adolescents eat?

For good dental health, one may want to keep these tips in mind when choosing meals and snacks.

To plan a healthy diet for an adolescent, *Canada's Food Guide* is a good reference:¹¹

- Breads, cereals, and grain products: 6–10 servings daily
- Meats and alternates: 2–3 servings daily
- Fruits and vegetables: 5–10 servings daily
- Milk and milk products: 3–4 servings daily

Examples of healthy snacks that teens can take to school or eat at home:

- Crackers and cheese
- Fruits
- Low-fat yogurt
- Cut-up vegetables such as carrots, celery, pepper slices, cucumber slices
- Nuts – peanuts, cashews, etc.
- Whole-wheat raisin bagels
- Granola bars
- Microwave popcorn
- Trail mix of pretzels, walnuts, and shredded cereal
- Fig Newtons, oatmeal raisin cookies

Examples of non-sweet beverages that are low in acid and calories:

- Water (in bottles or otherwise)
- Skim or 1% milk
- Homemade ice-tea with artificial sweeteners

A word about calcium

Most adolescents know that calcium in milk helps build strong teeth. Dairy calcium in cheese and milk protein helps restore lost tooth mineral. The calcium and phosphate in cheese are absorbed into the plaque on teeth, helping to prevent cavities. Cheese also increases the secretion of saliva and alters its composition, neutralizing both plaque pH and acids and increasing the clearance of food from the mouth. For maximum protection, cheese should be eaten by itself at the end of a meal. As well, dairy fat coats the teeth, decreasing the amount of fermentable carbohydrate retained in the mouth and preventing acid from penetrating the teeth.¹²

Trigger questions for dental hygienists

Armed with this nutritional knowledge, what can the dental hygienist do to start the screening process? Here are some screening questions that the dental hygienist can consider asking the teenage client who exhibits signs of poor oral health and tooth decay:

- Can you tell me what you are eating for breakfast? lunch? dinner?
- Do you buy your foods at school?
- How often do you drink pop?
- What do you often snack on?
- Do you drink milk?
- What is your idea of a healthy, balanced diet? How often do you follow it?

Depending on the answers given, a dental hygienist may choose to provide simple nutritional information to hand out at the chair side such as the *Canada's Food Guide to Healthy Eating*, which can be obtained at any public health unit, or a "Healthy Snack and Beverage List" made from above information, to both the parents and the teen client. A timely suggestion or referral to the teen client's physician or dietitian can also be made should more serious nutritional concerns arise. Dietitians can be found in public health units, through physicians' referrals, in hospitals, as well as in private practice (dietitians in private practice can be found on the Dietitians of Canada web site at <www.dietitiansofcanada.ca>).

Conclusion

The link between good oral health and sound nutrition in adolescents is clear. Adolescence is a growing time when learning to eat properly can lead to lifelong health benefits, including good oral health. Many factors influence what the adolescent eats, including the media, parents, school, and their social environment. By increasing knowledge of current diet trends for this client group, dental hygienists have an opportunity to advance their practice and screen clients

for nutritionally related problems that may manifest themselves in poor oral health. Simple healthy eating guidelines can be given out at chair side along with good oral hygiene information, while serious concerns can be referred to other health practitioners as needed. Proper nutrition, combined with good dental hygiene habits such as brushing twice a day, flossing once a day, and drinking plenty of water plus regular visits to dental and other health practitioners, can help susceptible teens achieve a healthy body and a beautiful smile.

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Diabetes, Nutrition, Dental Health, and Aboriginal Clients:

THE ROLE OF THE DENTAL HYGIENIST

by Suzanne E. Downie,* BA, RN, CDE

Diabetes mellitus (diabetes) has reached epidemic proportions in certain populations in Canada, most notably the Aboriginal population.¹ Dental hygienists will be required to work more with clients of this population as diabetes rates increase along with the dental complications of this disease, and as dental hygienists' role as preventive therapists is fully recognized. It is imperative for dental hygienists to be aware of diabetes—the types, risk factors, symptoms, long-term complications, and treatments. It is important to be aware that diabetes can be prevented for future generations. Nutrition has long been known to be the foundation in the treatment of diabetes but many changes have taken place in the way that the rules of healthy eating are applied. It is important for dental hygienists to be able to provide



accurate, up-to-date information to their Aboriginal clients with diabetes, in a manner similar to the way clients are being coached by other members of the diabetes health care team, including dietitians, nurses, and doctors. In order to be effective in promoting better nutrition, dental hygienists need a knowledge of the history of nutrition in the Aboriginal population. Dental care is essential to the health of a person with diabetes. The Aboriginal population with diabetes is particularly vulnerable to the long-term complications of diabetes for reasons not yet fully understood, but some of the blame may lie with the nutritional and thus the dental health status of the population. The author offers some practical suggestions regarding the nutritional education of Aboriginal clients that may help dental hygienists to better influence the overall general health of their Aboriginal clients.

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Overview of diabetes

Accurate information about diabetes in the general population is readily available at many of the web sites listed in the references.^{2,3,4,5} Although diabetes is familiar to dental hygienists, a short review of information adapted from these sources is provided:

- Diabetes mellitus is a chronic disease that has no cure. There are three types of diabetes.
 - Type 1 diabetes occurs when the pancreas no longer produces any (or very little) of the hormone insulin. The body requires insulin to use sugar for energy. Approximately 10% of people with diabetes have type 1 diabetes.
 - Type 2 diabetes occurs when the pancreas does not produce enough insulin or when the body does not use the insulin that is produced effectively (insulin resistance). Ninety per cent of people with diabetes have type 2.
 - Gestational diabetes is a temporary condition that occurs during pregnancy. It affects 2% to 4% of all pregnancies with an increased risk of developing diabetes in the future for both mother and child.
- Besides gestational diabetes there are several risk factors for developing diabetes. These include:
 - being age 45 or over
 - being overweight (BMI, or Body Mass Index, greater than 25) especially if the weight is distributed in the abdominal area; a larger than normal waist measurement is another indicator
 - living a sedentary lifestyle
 - being a member of a high-risk group (of Aboriginal, Hispanic, Asian, or African descent)
 - having a family history of diabetes
 - having given birth to a baby who weighed over 4 kg (9 lbs) at birth
 - having high cholesterol or other fats in the blood
 - having been diagnosed with high blood pressure or heart disease
 - having higher than normal blood glucose levels (Impaired Fasting Glucose or Impaired Glucose Tolerance or both)

- Risk factors do not provide evidence that the client has diabetes. Signs and symptoms of diabetes that may indicate the presence of diabetes include the following:
 - extreme thirst (sometimes hunger)
 - frequent urination
 - unplanned weight loss
 - extreme fatigue or lack of energy
 - blurry vision
 - nausea/vomiting
 - frequent or recurring infections
 - cuts and bruises that are slow to heal
 - dry skin
 - tingling or numbness in hands or feet
- It is important to recognize that many people who have type 2 diabetes may display no symptoms and remain undiagnosed. A person with two or more symptoms should have their blood glucose levels tested immediately. Hyperglycemia is the state of having higher than normal blood glucose levels. Hypoglycemia is the state of having lower than normal blood glucose levels. The Canadian Diabetes Association's Clinical Practice Guidelines for the Management of Diabetes in Canada⁶ recommends routine screening every three years for everyone age 45 or over and screening every year for individuals with other risk factors. The sooner a person is diagnosed and has a management plan in place, the sooner the client can begin to prevent the long-term complications of the disease.⁶
- Diabetes is a leading cause of death by disease.² "Diabetes may be broadly described as a chronic, systemic disease characterized by abnormalities in the metabolism of carbohydrates, proteins, fats and insulin; and abnormalities in the structure and function of blood vessels and nerves."⁷
- When diabetes is left untreated or improperly managed over time, the high levels of blood sugar associated with diabetes can damage both the small (micro) and large (macro) blood vessels in the body, resulting in a variety of complications such as:²
 - heart disease and stroke: heart disease is two to four times more common in people with diabetes than those without the disease
 - retinopathy, glaucoma, and cataracts: diabetes is a leading cause of adult blindness
 - nephropathy: in Canada, people with diabetes account for 28% of all new cases of serious kidney disease
 - neuropathy: worldwide, half or more of all non-traumatic limb amputations are due to diabetes
 - depression

Management tools for diabetes

With careful self-management, these complications can be delayed and even prevented. Diabetes is ideally treated ideally with the client self-management approach.⁷ The person with diabetes is the centre of the health care team and is encouraged to lead the careful management of the disease

with advice and help from the professional members of the team. Many professionals make up the team including general practitioners, specialists, nurses, dietitians, physical activity therapists, and the dental care team. The team should be individualized to meet the needs of each client. Persons with diabetes can expect to live active and independent lives.² Diabetes is managed with the following tools:

- Diabetes education: All persons with diabetes need to learn about their condition in order to make appropriate choices as the centre of the health care team.
- Regular health care visits: Monitoring of a client's health status at regular intervals can warn of the onset of preventable complications.
- Healthy eating: The timing, quality, and quantity of food eaten play an essential role in regulating blood sugar and fat levels.
- Physical activity: Regular exercise helps the body to regulate blood sugar levels, achieve weight loss, reduce stress, and enhance overall fitness.
- Healthy weight: Maintaining a healthy weight is especially important in the control of type 2 diabetes and insulin resistance.
- Medication: Type 1 diabetes always requires daily injections of insulin. Type 2 diabetes may be controlled with oral medications and/or insulin. There are a variety of oral medications on the market. A variety of other medications may be required for associated conditions including high blood pressure and high blood fats, depression, and weight management.
- Lifestyle management: Learning to reduce stress levels of all kinds (mental, emotional, physical, and spiritual) in day-to-day life can help people with diabetes better manage their disease.²

It may be important to emphasize that not all of the management tools may be chosen by a client and his or her health care team to include in the self-management plan. Those listed above are the tools from which a person with diagnosed diabetes may choose.

But what tools can be used by a person who is considered high risk? Researchers in the Diabetes Prevention Program⁸ have shown that type 2 diabetes maybe prevented or delayed in a person who does not yet have the disease.

With a careful management plan and a combination of the tools, it is possible to prevent or delay Type 2 diabetes in those persons who do not yet have the disease but who have some or all of the risk factors.⁸ An individual or a specific population can focus on the tools that may help prevent or delay the onset of the disease. A healthy diet, exercise,⁸ maintaining a healthy weight, and reducing stress are all important prevention tools. Health prevention and promotion work is recognized as an important part of diabetes management in whole populations and countries.

Canadian Diabetes Strategy

In 1999 the Canadian government began a comprehensive plan to address the problem of diabetes in this country. The Canadian Diabetes Strategy (CDS)⁹ has focused

\$115 million in federal funding over five years on three areas in which to attack the complex problem of diabetes. These three areas are:

- development of a health promotion-disease prevention strategy for the entire population
- care and treatment, and diabetes prevention for First Nations people on reserve and in Inuit communities
- improvement of national and regional data about diabetes and its complications⁹

The CDS is an attempt to bring all government agencies and other organizations that have an interest in diabetes into one partnership to better plan the programs over the long term with the goal of prevention and management of diabetes. The epidemic of diabetes in Aboriginal communities is directly addressed in this strategy with \$58 million in funding allocated to the Aboriginal Diabetes Initiative (ADI).¹

Diabetes in the Aboriginal population

Diabetes was unknown in the Aboriginal populations of North America before 1940.¹ The prevalence of diabetes among First Nations is now at least three times the national average, with high rates occurring in all age groups. It is now considered an epidemic.¹ Due to delayed diagnosis, it may be assumed that the rates are actually higher.¹ Rates appear to be higher on reserve than off reserve.¹ Although there are fewer data about the Métis people, it appears the rate among the Métis is also well above the national average.¹ And data now show that the rates for Inuit people are also on the rise.¹

But diabetes is an important issue in the Aboriginal population for a variety of reasons other than high rates of disease.¹ "Important concerns include early onset, greater severity at diagnosis, high rates of complications, lack of accessible services, increasing trends, and increasing prevalence of risk factors for a population already at risk. Data available for some First Nations indicate a high prevalence of complications such as heart disease, hypertension, stroke, lower limb amputations, kidney disease, and eye disease. There is particular concern regarding two groups within the First Nations population: children" [who are being diagnosed with Type 2 diabetes at increasingly younger ages] and women of childbearing age [who are being diagnosed with gestational diabetes]. Approximately two thirds of the First Nations people diagnosed with diabetes are women."¹

"Because Aboriginal ancestry is a risk factor for diabetes, this disease is of importance to all Aboriginal communities. The ADI program is divided into two components, each with a separate framework and funding formula:

- First Nations On-reserve and Inuit in Inuit Communities Program
- Métis, Off-reserve Aboriginal and Urban Inuit Prevention and Promotion Program."¹

"The ADI has been developed in partnership with Aboriginal people. Programs which emphasize holistic approaches and strive to be culturally appropriate are now in place across the country. Aboriginal people are involved in all stages of development, implementation and program

maintenance."¹ Many of these programs have nutrition as their prime focus.

Nutrition and diabetes

Counselling and guidelines

Nutritional counselling for persons with diabetes has changed greatly in the past few years. Cynthia Lank gives an easy-to-read and clear nutritional summary on the Canadian Diabetes Association's web site.¹¹ Gone are the prescribed diets, snacks despite fullness, and denial of hunger pangs. The person with diabetes—it is no longer considered correct to say diabetic—is encouraged to follow Canada's *Guidelines for Healthy Eating* for all Canadians.¹² Meal planning for people with type 2 diabetes essentially follows the Nutritional Committee of the Canadian Diabetes Association's published *Guidelines for the Nutritional Management of Diabetes in the New Millennium*.¹³ This publication sets out recommendations for how people with diabetes should eat to stay as healthy as possible. The main goal is to keep blood glucose levels as close to normal as possible to prevent the long-term complications of diabetes. The United Kingdom Prospective Diabetes Study¹⁴ provided the evidence base for this statement.

This nutritional diabetes education can best be obtained from a registered dietitian.¹³ Unfortunately many person with diabetes, including Aboriginal persons, do not have access to a dietitian, are not referred to a dietitian, or do not attend appointments as they may believe eating is a skill they already have. Ideally, even those persons with diabetes who saw a dietitian at diagnosis should have regular nutritional education to update them on new products and information. Registered dietitians can help provide nutritional education that is suitable for all tastes, cultures, lifestyles, and families. They also can help with more difficult nutrition challenges such as allergies, pregnancy, related and unrelated medical problems, eating disorders, and weight management. Other diabetes educators should also be able to help the client with nutritional information in the absence of a registered dietitian. Other members of the diabetes health care team such as dental hygienists will be required to provide this information as well.

Thus the following information is not intended to replace the advice of a registered dietitian when one is available but is intended to give dental hygienists an overview of the main principles of healthy eating for people with diabetes so that information they may need to provide is accurate and up to date.

These guidelines are a combination of those developed as the key messages to be communicated to healthy Canadians over two years of age in *Canada's Guide to Healthy Eating* for all Canadians¹² and those developed by the Canadian Diabetes Association.¹³

1. Enjoy a variety of foods.
2. If you are thirsty, drink water.
3. Eat three meals a day at regular times and space meals no more than six hours apart. You may benefit from a healthy snack.

4. Emphasize cereals, breads, other grain products, vegetables, and fruit.
5. Choose lower-fat dairy products, leaner meats, and food prepared with little or no fat.
6. Limit sugars and sweets such as sugar, regular pop, desserts, candies, jam, and honey.
7. Achieve and maintain a healthy body weight by enjoying regular physical activity and healthy eating.
8. Limit salt, alcohol, and caffeine.

It is important to remember that each person with diabetes is an individual and each one of them will use these general guidelines in a unique manner to produce their own personal meal plan. There are several well-documented methods of planning meals. Some people use the carbohydrate counting method¹⁵ to adjust insulin requirements to the amount of blood sugar producing food eaten. Others use the Canadian Diabetes Association's *Food Choice Values and Symbols* and *Good Health Eating Guide Resources*¹⁶ that are used with a dietitian-prescribed diet and foods that are labeled appropriately. Others use the glycemic index method¹⁷ that allows them to adjust food intake to how their own body reacts to food that is eaten. Many persons use a combination of all three.

Carbohydrates, proteins, and fats

Calories are the energy produced from food. The number of calories a person needs to consume daily will vary with age, sex, height, weight, body type, physical activity, and other medical circumstances. The three main types of food are carbohydrates, proteins, and fats. Dietary carbohydrates from grains, legumes, vegetables, fruits, dairy products, and added sugars should provide 50–60% of the calories consumed each day. All carbohydrates affect blood glucose levels and the glycemic index is a measure of the degree by which blood glucose levels rise in response to a carbohydrate. There are lists of low and high glycemic index foods available.¹⁷ Foods with a low glycemic index may help the client to regulate blood glucose levels. A person experienced in managing diabetes ideally self-monitors blood glucose levels and will be familiar with how certain carbohydrates affect his/her own blood glucose levels. Up to 10% of total daily calories can come from added sugars, such as table sugar and sugar-sweetened products, without altering blood glucose control in most people with diabetes. From carbohydrate foods come fibre.¹⁹ Canadian adults should consume at least 25 to 35 grams per day from a variety of sources. Good sources of dietary fibre include whole grain cereals, breads, legumes and brown rice, fruits, and vegetables. Dietary fibre may help regulate blood glucose levels and increase the feeling of satiety and should ideally be consumed with each meal.

Protein is the second type of food that is required each day and is found in many food groups such as milk, plants, and meat. *Just the Basics*, a nutrition publication of the Canadian Diabetes Association,¹⁸ recommends that a variety of low-fat protein sources should be eaten daily and that the protein food should cover only one quarter of the dinner plate. Cynthia Lank warns that "excessive protein consumption may play a role in the development of diabetic nephropathy (kidney disease) thus anyone with kidney disease or who is

at high risk should get more information from their health care team."¹¹

Fats are the third type of food that must be eaten every day. Fat is a food that is difficult to avoid in today's food sources so, more than likely, a client will be conscious of limiting the amount of fat in his daily diet. The source of the fat is also important and the client will need to be mindful of the kinds of fat he/she is consuming. Most adults who are not trying to reduce their weight or lower their blood fats can consume up to 30% of their total daily calories in the form of fat (oils, margarine, salad dressings, and processed foods). Many persons with diabetes are trying to lose weight and have blood fat levels (total cholesterol, HDL, triglycerides) that need to be reduced by a combination of diet and medication. Cynthia Lank warns that "understanding the many kinds of fats and figuring out how to calculate fats from food labels can be confusing and frustrating."¹¹ She gives some practical suggestions of what to look for when purchasing fats as a person with diabetes must be a careful fat consumer.

Other food issues

Persons with diabetes have special needs in three other areas: alcohol, artificial sweeteners, and vitamins and minerals. All persons with diabetes must be wary when drinking alcohol. It can be the cause of hypoglycemia if more than one to two drinks per day are consumed and it can provide extra calories that contribute to hyperglycemia and weight gain.

Persons with diabetes need to be educated on foods that contain artificial sweeteners. Some sweeteners are considered nutritive because they provide some calories in the form of carbohydrate while non-nutritive sweeteners are calorie-free. One of the most difficult concepts to understand is that these no- or low-calorie sweeteners may be ingredients in foods that may be high in fat, which means they are high in calories.

Many persons with diabetes are concerned with vitamin and mineral deficiencies. Most persons who eat a healthy well-balanced diet are receiving the vitamins and minerals their bodies need from the food they eat. Of course, if they are severely limiting one food group or have special dietary restrictions due to a medical condition or religious preference, they will need to consult a dietitian or physician to make sure their vitamin and mineral needs are being met.

The relationship between diabetes and nutrition has long been known and researched²⁰ as has the relationship between diabetes and dental health.²¹ Diabetes is considered one of the causes of poor dental health. Recently more information has been brought to light regarding dental health possibly being causal in the evolution of diabetes.²² Nutritional health has long been causally associated with both dental health and diabetes. Thus the triad of diabetes, nutritional health, and dental health is truly multidimensional.²³ The relationship between dental health and diabetes will now be explored.

Dental health and diabetes

Persons with diabetes can usually be treated by their dental health care team in the same manner as the general population.²⁴ At times, it is the dental health care team that notices

the signs and symptoms of diabetes and may ask the client to see his or her general practitioner for diagnosis. Dryness in the mouth and sweet-smelling breath are two symptoms that the dental health care team may detect. Other signs and symptoms may be reported by the client in the health assessment portion of the appointment. Dental hygienists should always be aware of the risk factors and the signs and symptoms of diabetes when interviewing a client with Aboriginal ancestry.

Most diabetes-related dental problems can be avoided with an appropriate diabetes management plan, regular checkups, and a periodontal preventive maintenance program (dental checkups at 3 to 6 months with periodontal cleaning and clear oral hygiene instructions).²¹ A variety of problems result from poorly controlled diabetes and absence of regular preventive dental care. Diabetes is associated with increased incidence of gingivitis and destructive periodontitis as well as increased dental caries, xerostomia, candidiasis, altered taste, and burning mouth or tongue. All these conditions are exacerbated by diabetes-related pathologic events—hyperglycemia, neuropathy (nerve damage), and microangiopathy (damage to the small blood vessels)—but are caused mainly by common dental bacterial plaque.²¹ The medications that persons with diabetes must take may also contribute to a dry mouth.

Just as diabetes contributes to poor dental health, poor dental health may contribute to worsening of diabetes control.²¹ Nutritional status may be at risk if persons are subject to burning mouth or tongue, altered taste, loss of teeth, mouth and gum pain, tooth pain, altered occlusion, ill-fitting dentures, dry mouth, and lack of adequate saliva.²¹ The stress of these physical assaults may also cause worsening blood glucose control. Pregnant women with diabetes/gestational diabetes are at particular risk and oral infections may be associated with problems in the pregnancy including preterm low-birth-weight babies.²⁵

The dental nutritional counselling for a person with diabetes should be similar to that for a person without diabetes and should include recommendations to prevent plaque buildup and cavity formation.²¹ These guidelines should revolve around the fermentable carbohydrates and those factors that promote tooth decay such as form of ingestion, frequency of ingestion, nutrient composition, sequence of food intake, and the combination of foods.²¹ Touger-Decker and Sirois provide the following guidelines:

- Eat cariostatic foods (foods not promoting decay) for snacks: nuts, cheese, popcorn, vegetables.
- Limit between-meal eating and drinking of fermentable carbohydrates (sweetened drinks, donuts, cookies, potato chips, chocolate bars).
- Brush, rinse, or chew sugarless gum after eating sticky foods (crackers, chips, pretzels, dry cereal, and fruit).
- Pair cariogenic foods (foods promoting decay, i.e., crackers) with cariostatic foods (i.e., cheese) based on nutrient composition.
- Avoid regular and (sugared) hard candies, lozenges, gum, and other sweets.
- Choose sugar-free alternatives if desired.²¹

Situations may arise that present special dental challenges for the person with diabetes such as dental surgery and restorative work.²¹ At that time, it would be best for the dental hygienist to collaborate with the client and his or her diabetes health care team to assure that the client's needs for a healthy diet and timing of medications can be met.

Dental health, nutrition, and the Aboriginal population

The following is an extract from Health Canada's *A Second Diagnostic on the Health of First Nations and Inuit People in Canada* (November, 1999):²⁶

"6.6 Dental Health

In 1991, the national total mean Decayed, Missing, Filled Teeth (DMFT) of 12-year old First Nations children was 4.4, ranging from a high of 6.2 in Quebec to a low of 2.1 in the Yukon. This represented a significant improvement over the last two decades.⁷¹ However, it was about two to three times higher than the DMFT for non-Aboriginal children in Canada.⁷²⁻⁷⁵ Moreover, according to the FNIRHS, 22% of respondents reported experiencing dental problems or pain in the past month and about half needed dental treatment at the time of the survey. Dietary changes may have brought an increase in dental problems.⁷⁶ [References in original]

From this statement, it can be seen that Aboriginal nutrition factors may be having a detrimental effect on dental health as well as diabetes. Thus it is important to look at the trends in Aboriginal nutrition in Canada from a historical traditional vantage point. The following is from Health Canada's publication *Native Foods and Nutrition*:²⁷

"For thousands of years the Indians and Inuit in Canada lived off the produce from the land, rivers, lakes and the sea. Survival in this rugged, rich land was a measure of supreme skill in hunting and fishing, knowledge of native plants, and appropriate techniques of food preparation. There were many cultural groups living off the land before the advent of the Europeans and each had its own traditional foods."

Those near the sea ate fish and shellfish. Those along the Great Lakes were farmers of many varieties of agricultural products including corn, tomatoes, potatoes, squash, cucumbers, and beans that were new to Europeans. Those on the plains are known for their use of the buffalo while Inuit in the Arctic used the caribou in a similar manner. All tribes picked berries and root crops native to their areas. Herbal teas were used for medicine and drinks. Food preservation included smoking and drying. Cooking methods were varied and inventive from hot rock ovens to clay bakers in the sand.²⁷

Whatever the food sources, all of the people were able to glean a nutritionally balanced diet, generally a high-protein, low-fat, low-carbohydrate diet.

Then the Europeans arrived. Trading began and new foods were introduced, namely, sugar, wheat flour, pork, beef, potatoes, milk, oatmeal, and lard. Along with new foods came new methods of transportation, cooking and preservation of foods.²⁷

Today, many of the traditional foods are no longer plentiful enough to provide for the needs of all the people, and those who wish to remain hunters and fishermen must travel further from home. Some food sources have been contaminated by pollution. Nomadic lifestyles have been abandoned for reserve rural life or urban lifestyles. Food is bought in grocery stores, cooked in microwaves, and stored in refrigerators and freezers. It is transported to all communities by all the methods of modern transportation. Formula has replaced breastfeeding as the infant feed of choice. While all of this may seem like progress to some people, it has also brought with it the problems of poor health associated with poor nutrition and lack of physical activity.²⁷

At the root of poor nutrition is the poverty level of many of the families. Unemployment, northern isolation, lack of education all contribute to poverty. The more nutritious traditional foods have been replaced by the least expensive foods on the grocery store shelves resulting in a high-fat, high-carbohydrate, lower protein diet. The fish and wild meat have been replaced by bologna and regular hamburger. Wild greens, berries, roots, and vegetables have been replaced by the cheaper sources of vitamin C such as sweetened drinks. Fresh sources of fruit and vegetables are expensive in the winter months in isolated grocery stores. Bannock, made originally with natural fats, is made with lard (a less nutritious saturated fat) and white flour or has been replaced by white bread. White pasta, rice, and oatmeal are also used widely as whole grain varieties are more expensive. Snacks and treats are found in all community food stores including regular pop, potato chips and other crunchy snacks, sugared gum, candies, and chocolate bars. These changes in diet have brought about a variety of health problems including obesity, dental disease, cardiovascular disease, gallbladder disease, and diabetes.²⁷

Dental disease manifests itself in the communities as tooth decay, baby-bottle caries, periodontal or gum disease, and dental problems caused by missing teeth.²⁷ The main cause of these problems is the increasing ingestion of fermentable carbohydrates.

As the rates of these health problems increase, communities are mobilizing themselves with the help of the government to improve the health of their communities. A variety of programs, including the ADI, are directed at improving the nutritional and health status of the people.

At this point, it is important to sum up the information that has been presented. Diabetes is a disease that, although increasing throughout the world, is epidemic in Canada's Aboriginal population. The Canadian government is mobilizing against the problem with the Canadian Diabetes Strategy and the Aboriginal Diabetes Initiative. Nutrition plays an important role in the management and prevention of diabetes as well as in the maintenance of dental health. Dental care is very important to persons living with diabetes to help them maintain their health. Dental care may also play

a role in the prevention of diabetes. For Aboriginal persons living in Canada, the great changes in diet from traditional food sources to modern food sources, along with significant changes in lifestyle, have increased the incidence of both diabetes and dental health problems. Therefore, there is a vital role emerging for the dental hygienist to work with Aboriginal people.

Role for dental hygienists

Dental hygienists, armed with knowledge of the triad of diabetes/nutrition/dental health and of the nutritional needs of Aboriginal persons, can contribute to the comprehensive treatment of and education for Aboriginal persons with diabetes and at risk for diabetes. This knowledge and skill must be utilized together in practical ways that will affect the client population. The following are practical suggestions for effective ways to impart information to Aboriginal clients and to make a measurable difference in their general overall health status.

1. Take an opportunity to work with Aboriginal people to expand your own knowledge of their unique challenges.
2. Familiarize yourself with information about diabetes in the Aboriginal population.
3. Familiarize yourself with the unique culture of the clients you care for.²⁸
4. Use a form of cultural assessment tool²⁸ with your individual clients.
5. Be a role model, smile a lot (be friendly and show off your teeth), and eat healthily in public.
6. Be confident that you are an integral part of the diabetes health care team.
7. Work with other members of the diabetes health care team to provide integrated care and to educate them in dental health.
8. Report any unusual findings about your client to appropriate members of the health care team, e.g., sore feet, emotional disturbances.
9. Encourage the use of traditional foods.²⁹
10. Encourage the drinking of water (a traditional drink) and discourage the use of juice and pop and sweetened drinks for all clients, not just babies, toddlers, and children.
11. Encourage breastfeeding for long periods (six months or more).
12. Encourage non-sugared formula use when breastfeeding is not possible.
13. Discourage the use of pacifiers, especially those soaked in sugar or honey.
14. Teach your clients how to read nutrition labels.
15. Encourage healthier snacks and the eating of smaller meals and snacks more often during the day.
16. Encourage healthier feasts at gatherings: provide recipes, cooking classes, suggested menus.
17. Encourage healthy public policy, i.e., no pop or sweetened drinks in school machines; no processed meats (bologna and hot dogs) in school lunch/snack programs.

18. Provide information to policy makers: chiefs and council, health department directors, community health nurses, program directors, home care nurses, mental health providers, drug counselors, educators.
19. Dispel myths whenever you can and encourage appropriate sources of information.
20. Provide accurate information at every contact: put up posters; hand out brochures; attend events that your clients will be attending, i.e., pow-wows, fairs, camps, prenatal groups, elder gatherings; put up displays and attend to tell your story.
21. Advocate for no-smoking policies.
22. Discourage alcohol overuse.
23. Discourage recreational drug use.
24. Encourage exercise and participate in front of your clients.

Although many of the suggestions may seem insignificant or trite, they may have lasting effects on the health of a population. It is through the repeated one-on-one hygienist-to-client contact that new habits will be formed. Hygienists must use all of their skill set including, but not limited to, role modeling, teaching, mentoring, negotiating, and advocating to effectively participate in the Aboriginal diabetes care team. Dental hygienists have a vital role in managing the nutritional and dental health of Aboriginal persons who are living with diabetes now, and in preventing diabetes in future generations.

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"NUTRITION AND DENTAL HYGIENE" (continued from page 10)

how diet and nutrition may be linked to certain oral conditions and be able to recognize problematic dietary/nutritional conditions. Dental hygienists need to be able to manage nutrition-related oral health issues with clear communication and action, either through client guidance, appropriate referral, or collaboration with nutrition professionals within a multidisciplinary team.

I will be reading the articles in this issue with great pleasure and they surely will be required reading for my students as they study nutrition this spring!



Herbal Medicine and Vitamin/Mineral Supplements

by Anne Marie Ford,* BSc (Pharmacy)

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Just because it is natural does not necessarily mean it is safe." I repeat this over and over to audiences when I talk about the use of medications and complementary or alternative medicine. Any health care professional, when taking a patient's history and asking about medications, needs to also ask about any additional alternative products the patient may be taking, other than those prescribed by a physician. By ensuring that all this relevant information is included in the patient's history, misadventures and unanticipated (and unwanted) treatment outcomes can be avoided.



When we think of herbal medicine, we tend to think of natural, safe products that do not require a prescription. However, consider products such as digoxin that is derived from the foxglove plant (and a common medication for congestive heart failure), or morphine from a poppy, and you can begin to understand that herbal products are potentially quite potent and should be taken with caution and with proper counselling.

HERBAL MEDICINE

Over the past decade, herbal medicine usage has increased dramatically, part of the growing trend toward complementary/alternative medicines. Nearly 50% of Canadians reported using some form of alternative therapy and up to 80% of the world's population is estimated to routinely use some form of herbal medicine. Herbal products account for most of alternative treatments, with the most popular being

echinacea (31%), chamomile (20%), ginkgo biloba (20%), ginseng (19%), and St. John's wort (17%).

But what exactly *is* herbal medicine? Herbal medicine refers to the use of a plant, algae, or fungus for the prevention, treatment, or the amelioration of a disease state or symptom. Herbal medicine is also referred to as herbology, phytomedicine, or botanical medicine.

Herbal medicines are a great way for patients to treat their own ailments, but with that independence come misinformation and potential problems. Herbal medicines are most commonly used for chronic health problems such as arthritis, diabetes, fatigue, depression/anxiety, and poor memory. Most patients with such conditions are also taking other "traditional" medications. Because contraindication or drug interaction information is not included with herbal medicines, patients have no way of knowing if their illness or medication will interact with the herbal medicine. Thus it is vital for the patient to acquire knowledgeable information from a qualified professional, such as a pharmacist.

The majority of patients, when asked for a list of medications by a physician or dental professional, fail to include any alternate therapies they are following. This clearly shows a lack of knowledge of the potential effects of any alternative treatment. Ginkgo biloba is a good example: this is very popular for a wide variety of illnesses and ailments, but its antiplatelet properties are not widely known. Thus a person on anticoagulants could hemorrhage if he or she starts taking ginkgo, a potentially fatal reaction. Even if the patient is not taking anticoagulants, the ginkgo may thin the patient's blood, possibly posing significant problems during routine dental exams and cleaning.

Regulation and safety

Although Canadians spend nearly \$1 billion each year on alternative therapies—and about \$50 million on the products listed above—it was only in June 2003 that Health Canada produced the Natural Health Products Regulations, annexed to the Food and Drugs Act. The regulations came into force on January 1, 2004 (except for Section 6—disposition of licence applications—that comes into force on July 1, 2004).

Prior to these regulatory changes, herbal products for sale in Canada had to be classified as either a drug or a food. In the

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new regulations, “natural health product” is defined as “a substance set out in Schedule 1 or a combination of substances in which all the medicinal ingredients are substances set out in Schedule 1, a homeopathic medicine or a traditional medicine, that is manufactured, sold or represented for use in (1) the diagnosis, treatment, mitigation or prevention of a disease, disorder or abnormal physical state or its symptoms in humans; (2) restoring or correcting organic functions in humans; or (3) modifying organic functions in humans, such as modifying those functions in a manner that maintains or promotes health.” Schedule 1 lists the products included in the regulations: plant or plant material, alga, bacterium, fungus or a non-human animal material; any extracts or isolates of these substances; a list of vitamins; amino acids; essential fatty acids; minerals; and probiotics.

The new regulations address the problem of product safety and quality. The sale, manufacture, packaging, and labelling of natural health products, as well as their importation for sale and their storage, are covered. Natural health products now must be issued a “product licence” by Health Canada, with stringent criteria to be met regarding the medicinal ingredients, non-medicinal ingredients, the proposed brand name, conditions for use, and so forth. In addition, site licences are required for the manufacture, packaging, labelling, or importing of natural health products. The regulations contain detailed specifications concerning the premises, equipment, sanitation, quality assurance, and record keeping.

And safety should not be taken lightly when considering herbal products. The American Society of Anesthesiologists warns patients to stop any herbal product before surgery. Licorice, ginseng, and ephedra are all known to increase heart rate or blood pressure, which in turn may lead to problems during surgery. Garlic, ginkgo, and ginger can all increase the risk of bleeding and so should therefore be discontinued at least two weeks before surgery. It is important for the patient’s safety to understand the common herbs in use today, what they are used for, and their possible side effects or adverse reactions.

Ginseng, ginkgo, and licorice

Ginseng is available in many different varieties, with Korean ginseng the most popular. This herb has been reported to be a “cure all” and is believed to help boost the body’s immune system, to increase vitality, and to combat feelings of stress, lack of energy, and lack of concentration. A staple in traditional Chinese medicine for many years, it is used to treat such things as asthma, digestive complaints, excessive sweating, as well as sexual dysfunction or inadequacy. Ginseng should be avoided by patients with bleeding disorders, high blood pressure, acute infections, and acute asthma attacks. It should not be taken concurrently with caffeine, and patients taking some antidepressant medications and anticoagulants should avoid this herb.

Ginkgo is derived from the ginkgo biloba tree, which has been in existence for over 150 million years. Ginkgo affects platelet activity, is a circulatory stimulant and an antioxidant. It has been used for cognitive and memory impairment, dizziness, tinnitus, vertigo, headaches, and a multitude of other circulatory related problems. As ginkgo affects

platelet activity, concomitant use with anticoagulant medication should be avoided. Due to this effect, gingival hyperplasia has been reported in some patients.

Licorice, otherwise referred to as glycyrrhiza, has been studied extensively. More often used as a sweetening agent than for its pharmacological activity, it has been used to treat fatigue as well as gastrointestinal symptoms. One of the more common and potentially serious side effects associated with licorice use is its ability to cause hypertension. Patients on blood pressure or cardiac medication should not use this product.

VITAMINS AND MINERALS

It is not only herbs that are prominent today; many vitamins and minerals are also in the news. It is astounding to recognize how many of these natural products are depleted from our systems and how this depletion may be the root cause of many ailments. Vitamins are essential for normal metabolism in the body, working with the body’s enzyme system. Vitamins are co-enzymes and if they are insufficient, deficiency diseases may result. We are all aware that the B vitamins help to alleviate stress in our bodies. However, do we really think of a vitamin deficiency when we see a canker sore or cracked lip corners? A deficiency in folic acid and vitamin B-6 respectively could be the likely culprits for these two problems. Since the B vitamins figure so prominently in our lives and our health, the following section of this article is devoted specifically to these vitamins, their functions, deficiencies, and treatments.

Vitamin B-6

Vitamin B-6, a water-soluble vitamin, was first isolated in the 1930s. There are six forms of this vitamin: pyridoxal (PL), pyridoxine (PN), pyridoxamine (PM), and their phosphate derivatives, pyridoxal 5'-phosphate (PLP), pyridoxine 5'-phosphate (PNP), and pyridoxamine 5'-phosphate (PNP). PLP is the active co-enzyme form and has the most importance in humans.

Vitamin B-6 is required in the diet because we cannot synthesize it and the co-enzyme PLP plays a vital role in the functioning of approximately 100 enzymes that catalyze essential chemical reactions in the human body.

Co-enzyme PLP

PLP functions as a co-enzyme for the enzyme glycogen phosphorylase that catalyzes the release of glucose stored in the muscle. PLP is also a co-enzyme for reactions used to generate glucose from amino acids. The synthesis of the neurotransmitter serotonin and other neurotransmitters in the brain is catalyzed by a PLP-dependent enzyme. PLP functions as a co-enzyme in the synthesis of heme, a component of hemoglobin. Hemoglobin is found in red blood cells and is critical to their ability to transport oxygen throughout the body.

PLP is also instrumental in the synthesis of niacin, another vitamin required by the body, as it is a co-enzyme in the conversion of a dietary amino acid tryptophan to niacin. Thus, adequate vitamin B-6 decreases the requirement for niacin in the diet. Steroid hormones, such as estrogen and testosterone, exert their effects in the body by binding to steroid

Food	Serving	Vitamin B-6 (mg)
Fortified cereal	1 cup	0.5–2.5
Banana	1 medium	0.68
Salmon	3 oz.*	0.48
Turkey without skin	3 oz.*	0.39
Chicken, light meat without skin	3 oz.*	0.46
Potato, baked, with skin	1 medium	0.70
Spinach, cooked	1 cup	0.44
Hazelnuts, dry roasted	1 oz.	0.18
Vegetable juice cocktail	6 oz.	0.25

* A 3 oz. serving of meat or fish is about the size of a deck of cards.

Table 1. Foods rich in vitamin B-6

hormone receptors in the nucleus of the cell and altering gene transcription. However, PLP inhibits this binding of steroid hormones, thus decreasing their effects. This suggests that the vitamin B-6 status of an individual may have implications for diseases affected by steroid hormones, such as breast cancer and prostate cancer.

Vitamin B-6 deficiency

Severe deficiency of this vitamin is uncommon. Alcoholics are thought to be most at risk, due to a low intake and impaired metabolism of the vitamin. In the early 1950s, seizures were observed in infants as a result of severe vitamin B-6 deficiency due to an error in the manufacture of infant formula. Abnormal electroencephalogram (EEG) patterns have been noted in some studies of vitamin B-6 deficiency. Other neurologic symptoms noted in severe vitamin B-6 deficiency include irritability, depression, and confusion; additional symptoms include inflammation of the tongue, sores or ulcers of the mouth, and ulcers of the skin at the corners of the mouth.

Because vitamin B-6 is involved in so many aspects of metabolism, several factors are likely to affect an individual's requirement for vitamin B-6. Of those factors, protein intake has been studied the most. Increased dietary protein results in an increased requirement for vitamin B-6, probably because PLP is a co-enzyme for many enzymes involved in amino acid metabolism. (Amino acids are the building blocks of proteins.)

Recommended daily allowance

Unlike previous recommendations, the Food and Nutrition Board (FNB) of the Institute of Medicine did not express the most recent recommended daily allowance (RDA) for vitamin B-6 in terms of protein intake, although the relationship was considered in setting the RDA. The current RDA was revised by the FNB in 1998:

- men and women, 19–50: 1.3 milligrams (mg) a day
- men 51 years of age and older: 1.7 mg/day
- women 51 years of age and older: 1.5 mg/day

Surveys in the United States have shown that dietary intake of vitamin B-6 averages about 2 mg/day for men and 1.5 mg/day for women. A survey of elderly individuals found that men and women over 60 consumed about 1.2 mg/day and 1.0 mg/day, respectively, both less than the current RDA. Certain plant foods contain a unique form of vitamin B-6 called pyridoxine glucoside. This form of vitamin B-6 appears to be only about half as bioavailable as the vitamin B-6 from other food sources or supplements. Approximately 75% of vitamin B-6 in a mixed diet has been found to be bioavailable and in most cases, including foods in the diet that are rich in vitamin B-6 should supply enough to prevent deficiency. However, those following a very restricted vegetarian diet might need to increase their vitamin B-6 intake by eating food fortified with vitamin B-6 or by taking a supplement. Foods that are relatively rich in vitamin B-6 are listed in Table 1. For more information on the nutrient content of foods you eat frequently, search the U.S. Department of Agriculture (USDA) food composition database.

A few recent studies have shown an association between declines in cognitive function or Alzheimer disease in the elderly and inadequate nutritional status of folic acid, vitamin B-12, and vitamin B-6 and thus elevated levels of homocysteine. One observational study found higher levels of plasma vitamin B-6 to be associated with better performance on two measures of memory, but unrelated to performance on eighteen other cognitive tests. It is at present unclear whether marginal B vitamin deficiencies, relatively common in the elderly, contribute to age-associated declines in cognitive function or whether both result from processes associated with aging and/or disease.

Pharmacologic doses of vitamin B-6

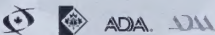
Vitamin B-6 supplements at pharmacologic doses (i.e., doses much larger than those needed to prevent deficiency) have been used in an attempt to treat a wide variety of conditions, some of which are discussed below. In general, well-designed, placebo-controlled studies have shown little evidence of benefit from large supplemental doses of vitamin B-6. Because vitamin B-6 is required for the metabolism of the amino acid tryptophan, the tryptophan load test was used as a functional assessment of vitamin B-6 status.

Delivering Excellence Throughout the World

No matter where the setting or the location, assistants enhance the delivery of quality dental health care and are critical members of the dental team. The role of dental assistants has evolved over the years, with assistants now involved with many aspects of a dental practice.



March 7-13, 2004
has been designated by the Canadian Dental Assistants' Association along with the Canadian Dental Association, the American Dental Assistants Association and the American Dental Association as the perfect time to acknowledge and recognize the versatile, multitasked member of your dental team – your Dental Assistant.

This message is promoted by the Canadian Dental Assistants Association, the Canadian Dental Association, Ottawa, Ontario and the American Dental Assistants Association in cooperation with the American Dental Association, Chicago, IL.

Abnormal tryptophan load tests in women taking high-dose **oral contraceptives** in the 1960s and '70s suggested that these women were vitamin B-6 deficient. The abnormal results led a number of clinicians to prescribe high doses (100–150 mg/day) of vitamin B-6 to women in order to relieve depression and other side effects sometimes experienced with oral contraceptives. However, most other indices of vitamin B-6 status were normal in women on high-dose oral contraceptives and it is likely that the abnormality in tryptophan metabolism was not due to vitamin B-6 deficiency. A recent study of women on the low-dose oral contraceptives that are currently prescribed showed no benefit of doses up to 150 mg/day of vitamin B-6 (pyridoxine) over a placebo in the prevention of side effects, such as nausea, vomiting, dizziness, depression, and irritability.

The use of vitamin B-6 to relieve the side effects of high-dose oral contraceptives led to the use of vitamin B-6 in the treatment of **premenstrual syndrome** (PMS). PMS refers to a cluster of symptoms, including but not limited to fatigue, irritability, moodiness/depression, fluid retention, and breast tenderness that begin sometime after ovulation (mid-cycle) and subside with the onset of menstruation. A review of 12 placebo-controlled, double-blind trials of vitamin B-6 in PMS concluded that evidence for a beneficial effect was weak. A more recent review of 25 studies of vitamin B-6 and PMS suggested that doses of vitamin B-6 up to 100 mg/day may be of value, but conclusions were limited by the poor quality of most of the studies evaluated. For more information regarding PMS in general, the National Association for Premenstrual Syndrome (NAPS) in the United Kingdom (www.pms.org.uk) offers information and resources. Because the co-enzyme PLP is key to the synthesis of the neurotransmitters serotonin and norepinephrine, it has been suggested that vitamin B-6 deficiency may lead to depression. However, clinical trials have not provided evidence that vitamin B-6 supplementation is effective in the treatment of depression.

Carpal tunnel syndrome causes numbness, pain, and weakness of the hand and fingers due to compression of the median nerve at the wrist. It may result from repetitive stress injury of the wrist or from soft tissue swelling that sometimes occurs with pregnancy or hypothyroidism. Several early studies by the same investigator suggested that vitamin B-6 status was low in individuals with carpal tunnel syndrome and that supplementation with 100–200 mg/day over several months was beneficial. A recent study found decreased blood levels of PLP to be associated with increased pain, tingling, and nocturnal waking (all symptoms of carpal tunnel syndrome) in men who were not taking vitamins. Studies using electrophysiological measurements of median nerve conduction have generally failed to find an association between vitamin B-6 deficiency and carpal tunnel syndrome. While a few trials noted some symptomatic relief with vitamin B-6 supplementation, double-blind, placebo-controlled trials have not generally found vitamin B-6 to be effective in treating carpal tunnel syndrome.

Adverse effects

Because adverse effects have been documented only with vitamin B-6 supplements and never with food sources, only the supplemental form of vitamin B-6 (pyridoxine) is discussed

with respect to safety. Although vitamin B-6 is a water-soluble vitamin and is excreted in the urine, very high doses of pyridoxine over long periods of time may result in painful neurological symptoms known as sensory neuropathy. Symptoms include pain and numbness of the extremities, and in severe cases, difficulty walking. Sensory neuropathy typically develops at doses of pyridoxine in excess of 1,000 mg per day. However, there have been a few case reports of individuals who developed sensory neuropathies at doses of less than 500 mg daily over a period of months. None of the studies in which an objective neurological examination was performed found evidence of sensory nerve damage at intakes of pyridoxine below 200 mg/day. To prevent sensory neuropathy in virtually all individuals, the Food and Nutrition Board of the Institute of Medicine set the tolerable upper intake level (UL) for pyridoxine at 100 mg/day for adults. Because placebo-controlled studies have generally failed to show therapeutic benefits of high doses of pyridoxine, there is little reason to exceed the UL of 100 mg/day.

Drug interactions

Certain medications interfere with the metabolism of vitamin B-6 and may result in deficiency if individuals taking such medications are not given supplemental vitamin B-6. The anti-tuberculosis medications, isoniazid and cycloserine, the metal chelator, penicillamine, and anti-parkinsonian drugs including L-dopa form complexes with vitamin B-6, creating a functional deficiency. Alternatively, high doses of vitamin B-6 may alter the efficacy of other medications, e.g., decreasing the efficacy of the anticonvulsants phenobarbital, Dilantin, and L-dopa.

Folate and folic acid

The terms folic acid and folate are often used interchangeably for this water-soluble B-complex vitamin. Folic acid, the most stable form, occurs rarely in foods or the human body but is the form used most often in vitamin supplements and fortified foods. Naturally occurring folates exist in many chemical forms and are found in foods as well as in metabolically active forms in the human body. In the discussion below, “folates” refer to the forms found in food or the body, while “folic acid” refers to the form found in supplements or fortified foods.

Folate

Folate deficiency

Folate deficiency occurs in a number of situations. For example, low dietary intake and diminished absorption, as in alcoholism, can result in a decreased supply of folate. Certain conditions such as pregnancy or cancer result in increased rates of cell division and metabolism, leading to an increase in the body's demand for folate. Several medications may also contribute to deficiency.

Individuals in the early stages of folate deficiency may not show obvious symptoms, but blood levels of homocysteine may increase. Rapidly dividing cells are most vulnerable to the effects of folate deficiency. Thus, when the folate supply to the rapidly dividing cells of the bone marrow is inadequate, blood cell division becomes abnormal, resulting in fewer but larger red blood cells. This type of anemia is called

Life stage	Age	Males (mcg/day)	Females (mcg/day)
Infants	0–6 mths.	65 (AI)	65 (AI)
Infants	7–12 mths.	80 (AI)	80 (AI)
Children	1–3 years	150	150
Children	4–8 years	200	200
Children	9–13 years	300	300
Adolescents	14–18 years	400	400
Adults	19 years and older	400	400
Pregnancy	All ages	–	600
Breastfeeding	All ages	–	500

Table 2. Recommended dietary allowances for folate in Dietary Folate Equivalents (DFE)

megaloblastic or macrocytic anemia, referring to the large immature red blood cells. Neutrophils, a type of white blood cell, become hypersegmented, a change that can be found by examining a blood sample microscopically. Because normal red blood cells have a lifetime of approximately four months in the circulation, it can take months for folate deficient individuals to develop the characteristic megaloblastic anemia. Progression of such an anemia leads to a decreased oxygen-carrying capacity of the blood and may ultimately result in symptoms of fatigue, weakness, and shortness of breath. It is important to point out that megaloblastic anemia resulting from folate deficiency is identical to the megaloblastic anemia resulting from vitamin B-12 deficiency, and further clinical testing is required to diagnose the true cause of the anemia.

Recommended daily allowance

The dietary folate requirement was traditionally defined as the amount needed to prevent a deficiency severe enough to cause symptoms like anemia. The most recent RDA (1998) was based primarily on the adequacy of red blood cell folate concentrations at different levels of folate intake, which have been shown to correlate with liver folate stores. Maintenance of normal blood homocysteine levels, an indicator of one-carbon metabolism, was considered only as an ancillary indicator of adequate folate intake.

Pregnancy is associated with a significant increase in cell division and other metabolic processes requiring folate co-enzymes. The RDA for pregnant women is therefore considerably higher than for non-pregnant women. However, the prevention of neural tube defects (NTD) was not taken into consideration in setting the RDA for pregnant women. Rather, reducing the risk of NTD was considered in separate recommendation for women *capable* of becoming pregnant, because the crucial events in the development of the neural tube occur before many women are aware that they are pregnant. When the Food and Nutrition Board of the Institute of Medicine set the new dietary recommendation for folate, they introduced a new unit—the Dietary Folate Equivalent or DFE (see Table 2). Use of the DFE reflects the higher bioavailability of synthetic folic acid found in supplements and fortified foods compared with that of naturally occurring food folates:

- 1 microgram (mcg) of food folate provides 1 mcg of DFE
- 1 mcg of folic acid taken with meals or as fortified food provides 1.7 mcg of DFE

- 1 mcg of folic acid (supplement) taken on an empty stomach provides 2 mcg of DFE

For example, a serving of food containing 60 mcg of folate would provide 60 mcg of DFE, while a serving of pasta fortified with 60 mcg of folic acid would provide 102 mcg DFE (1.7 x 60) due to the higher bioavailability of folic acid. A folic acid supplement of 400 mcg taken on an empty stomach would provide 800 mcg of DFE.

Fetal growth and development is characterized by widespread cell division. Adequate folate is critical because of its roles in DNA and RNA synthesis. Neural tube defects (NTDs) result in either anencephaly or spina bifida, devastating and sometimes fatal birth defects. The defects occur between the 21st and 27th days after conception, a time when many women do not realize they are pregnant. The risk of NTD in the United States prior to fortification of foods with folic acid was estimated to be one per 1,000 pregnancies. Results of randomized trials have demonstrated 60% to 100% reductions in NTD cases when women consumed folic acid supplements in addition to a varied diet during the periconceptional period (about one month before, and one month after, conception). The results of these and other studies prompted the U.S. Public Health Service to recommend that all women capable of becoming pregnant consume 400 mcg of folic acid daily to prevent NTDs. The recommendation was made to all women of childbearing age because adequate folic acid must be available very early in pregnancy and because many pregnancies in the United States are unplanned. Despite the effectiveness of folic acid supplementation, it appears that fewer than half of women who become pregnant follow the recommendation. To decrease births affected by NTD, the U.S. Food and Drug Administration implemented legislation in 1998 requiring the fortification of all enriched grain products with folic acid. The required level of folic acid fortification in the United States was estimated to provide 100 mcg of additional folic acid in the average person's diet, though it probably provides more than this due to overuse of folic acid by food manufacturers.

Green leafy vegetables (foliage) are rich sources of folate and provide the basis for its name. Citrus fruit juices, legumes, and fortified cereals are also excellent sources. A number of

Food	Serving	Folate (mcg)
Fortified breakfast cereal	1 cup	200–400
Orange juice (from concentrate)	6 oz.	82
Spinach, cooked	1/2 cup	131
Asparagus, cooked	1/2 (~ 6 spears)	131
Lentils, cooked	1/2 cup	179
Garbanzo beans, cooked	1/2 cup	141
Lima beans, cooked	1/2 cup	78
Bread	1 slice	20 (folic acid)*
Pasta, cooked	1 cup	60 (folic acid)*
Rice, cooked	1 cup	60 (folic acid)*

* To help prevent neural tube defects, the FDA required 1-4 milligrams (mg) of folic acid per kilogram (kg) of grain to be added to refined grain products, which are already enriched with niacin, thiamin, riboflavin, and iron, as of January 1, 1998. The addition of nutrients to foods in order to prevent a nutritional deficiency or restore nutrients lost in processing is known as fortification. It has been estimated that this level of fortification increases dietary intake by an average of 100 mcg folic acid/day. For more information on folic acid fortification, review the FDA fact sheet at www.cfsan.fda.gov/~dms/wh-folic.html.

Table 3. Foods rich in folate

folate-rich foods are listed in Table 3. For more information on the nutrient content of foods you eat frequently, search the USDA food composition database.

Folic acid

The principal form of supplementary folate is folic acid, available in single ingredient and combination products such as B-complex vitamins and multivitamins. Doses greater than or equal to 1 mg require a prescription. No adverse effects have been associated with the consumption of excess folate from foods; thus, concerns regarding safety are limited to synthetic folic acid intake. Vitamin B-12 deficiency, though often undiagnosed, may affect a significant number of people, especially older adults. One symptom of vitamin B-12 deficiency is megaloblastic anemia, which is indistinguishable from that associated with folate deficiency. Large doses of folic acid given to an individual with an undiagnosed vitamin B-12 deficiency could correct megaloblastic anemia without correcting the underlying vitamin B-12 deficiency, leaving the individual at risk of developing irreversible neurologic damage. Most cases of this sort of neurologic progression in vitamin B-12 deficiency have been seen at doses of folic acid of 5,000 mcg (5 mg) and above. To be very sure of preventing irreversible neurological damage in B-12 deficient individuals, the Food and Nutrition Board of the Institute of Medicine advises that all adults limit their intake of folic acid (supplements and fortification) to 1,000 mcg (1 mg daily) (see Table 4). The board also noted that vitamin B-12 deficiency is very rare in women in their child-bearing years, making the consumption of folic acid at or above 1,000 mcg/day unlikely to cause problems, although there is limited data on the effects of large doses.

Drug interactions

When taken in very large therapeutic dosages, for example in the treatment of severe arthritis, nonsteroidal anti-inflammatory drugs (NSAIDs) such as aspirin or ibuprofen may interfere with the metabolism of folate. Routine low-dose use of NSAIDs has not been found to adversely affect folate status. The anticonvulsant phenytoin has been shown to inhibit the intestinal absorption of folate, and several studies have associated decreased folate status with long-term use of the anticonvulsants, phenytoin, phenobarbital, and primidone. However, few studies controlled for differences in folate intake between anticonvulsant users and nonusers. Taking folic acid at the same time as the cholesterol-lowering agents cholestyramine and colestipol may decrease the absorption of folic acid. Methotrexate is a folic acid antagonist used to treat a number of diseases, including rheumatoid arthritis and psoriasis. Some of the side effects of methotrexate are similar to those of severe folate deficiency, and increased dietary folate or supplemental folic acid may decrease side effects without reducing the efficacy of methotrexate.

A number of other medications have been shown to have antifolate activity, including trimethoprim (an antibiotic), pyrimethanine (an antimalarial), triamterene (a blood pressure medication), and sulfasalazine (a treatment for ulcerative colitis). Early studies of oral contraceptives containing high doses of estrogen indicated an adverse effect on folate status, which has not been supported by more recent studies on low-dose oral contraceptives in which dietary folate was controlled.

Age group	UL (mcg/day)
Infants	0–6 mths.
Infants 0–12 mths.	Not possible to establish*
Children 1–3 years	300
Children 4–8 years	400
Children 9–13 years	600
Adolescents 14–18 years	800
Adults 19 years and older	1,000

* Source of intake should be from food and formula only.

Table 4. Tolerable upper intake level (UL) for folic acid

CONCLUSION

A careful history must be taken from all patients, and as shown above, it is important to remember to ask about herbal and other alternative products that have not been prescribed by a dental or medical professional. Most patients will not think to include these non-prescription therapies in their list of medications because they do not view them as such. Being natural, herbals and vitamins must therefore be healthy and risk-free! By being aware of possible interactions, the dental and health care provider may prevent unforeseen consequences. The patient will probably be surprised and even a bit alarmed by learning about the potency of these natural substances but should be relieved to learn more about this growing trend.

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Nutrition, Gender, and Oral Health: *Something to Chew On*

by Audrey Penner,* MEd, BSc, DipDH

Abstract

While oral health's relationship to nutrition has long been established, the area of nutrition, gender, and oral health has not been well researched. Diseases affecting or stemming from the oral cavity all have nutritional aspects in their development, progress, and/or prognosis. Where these diseases are gender specific, dental hygiene practitioners need to consider how to integrate nutritional information into education designed to meet the needs of the client in their care.

The diseases focused on in this article—oral cancer, diabetes mellitus, and osteoporosis—are all discussed in the context of their implication for oral health or their manifestation within the oral cavity. Nutritional perceptions and how they differ in relation to gender are presented. These perceptions may affect the amount or type of information required by the client. The gender-specific nature of oral cancer, diabetes mellitus, and osteoporosis is also discussed and nutritional recommendations for these various diseases are put forth.

Nutritional requirements and perceptions have been integrated with current literature on oral health needs related to the various diseases presented.

Introduction

The old adage says that “we are what we eat” but when it comes to gender, there is a very definite difference in the way food affects us and our overall health. Men and women have a different genetic makeup and respond differently to oral and systemic disease. A number of diseases have different patterns of occurrence and development

dependent on gender: osteoporosis, osteoarthritis, responses to radiation and chemotherapy, chronic facial pain, chronic fatigue syndrome, and fibromyalgia all exhibit gender differences.¹ The difference in gender continues on in lifestyle choices and nutritional intake.² Knowing this, what are the implications—based on nutritional choices and gender-specific diseases—for oral health?

This article examines the information available on the topic of the gender relationship to the dual concepts of nutrition and oral health. The literature review involved in writing this article covered basic nutrition and oral health and moved on to specific gender needs in nutrition and oral health. It soon became apparent that the research on gender-specific nutritional needs and oral health is rare. What is not rare, however, is the amount of information on gender-specific diseases and nutritional concerns related to those diseases. A number of gender-dominated illnesses have distinct oral health and nutritional needs for the client. Dental hygiene practitioners should be aware of these gender-based disease/health issues in order to provide optimum information for their clients. Therefore, it is important to study, through the lens of gender specificity, those diseases that have specific nutritional requirements and affect oral health. Understanding the nutritional needs of patients with these illnesses enables practitioners to provide information to clients to assist them in improving oral health and overall wellness.

While many illnesses show distinct epidemiological patterns related to gender,¹ this article focuses on diabetes mellitus, osteoporosis, and oral cancer. These three diseases show strong gender patterns in terms of probability and development and while each has a focused nutritional need, the manifestation of these diseases also has specific oral health concerns.

Gender perceptions of nutrition

Nutrition is a popular topic and is often concerned with weight loss and obesity. It has become a fad to count calories or discuss the latest anti-aging nutrient miracle. But does the average person realize the extent to which nutrition affects



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day-to-day health and the components of total health, including oral health?

According to the Department of Family and Consumer Sciences, University of Wyoming, women are more "nutrition wise" than men. Women report higher intakes of fruits, vegetables, and high fibre cereals, and lower intakes of milk and sweetened beverages. Women are also less likely to order super-sized portions at fast food franchises. The conclusion drawn from this is that women have a greater awareness of high fat diets and the need to avoid fat intake. Overall, this study indicates that except for calcium, female diets are more nutrient dense than are male diets.³

In Canada, the National Institute of Nutrition reports that 59% of women and 47% of men identify nutrition as extremely important to their overall health.² The vast majority of Canadians—93%—believe that foods have health benefits beyond basic nutrition, and most recognize that foods enhance health and prevent disease. Canadians in the 2002 Health Canada study, *Tracking Nutrition Trends*,² were able to cite many health promoting foods such as broccoli, milk, fresh fruit, leafy green vegetables, and fibre. According to this study, the main concern of Canadians when reviewing their own diets was the intake of fat, including saturated fats. These data, broken down by gender, show men were less concerned with fat intake. Men were also unconcerned about their intake of iron and calcium while women were very concerned. In addition to being more concerned about their overall fat intake, women were more concerned about the types of fat absorbed, for example, saturated fats, omega-3 fats, and trans-fatty acids.

With this apparent tendency for nutritional perceptions and concerns to break down along gender lines, it is important to look further at the issues of gender-specific diseases and the nutritional/oral health components affecting dental hygiene practitioners' clients.

Gender specificity and diseases affecting oral health

Diabetes mellitus affects millions of Canadians, approximately 4% of the total population.⁴ The incidence of diabetes mellitus tends to increase with age, throughout the five-year periods outlined in Statistics Canada data. In every age category, more males than females have been diagnosed with the disease. This trend has been apparent in statistical data since 1994–95. The trend also shows an increasing number of diabetics diagnosed annually in both male and female category. In 1994–95, 6.9% of males between the ages of 55 and 64 were diagnosed with diabetes, compared with only 6% of females. However, by the year 2001, the number of males diagnosed increased to 10% while the percentage of females had increased to 7.3%. The gender difference in incidence appears to be increasing, particularly in the over-55 age range. Diabetes mellitus is the cause of death for 20.6% of men and 14.8% of women when compared with all causes of death in the Canadian population.⁵

Oral cancer can be viewed as a lifestyle disease, being more prevalent in smokers or tobacco chewers.⁶ This disease has a higher incidence among males than females.⁷ While

Statistics Canada does not provide data on the number of oral cancer cases per year, it does provide data on the lifetime probability of developing and dying from oral cancer. For males aged 60, this probability is 0.5; for females in the same age group, it is only 0.2 for females, less than half. The ratio at age 70 shows males at 0.6 while females remain at 0.2. Thus males are increasingly more likely to develop oral cancer. By age 80, the probability of males developing oral cancer drops to 0.4 and the probability for females remains the same, 0.2.⁷ For women, oral cancer is the least probable cancer for development and death. However, for men, the Statistics Canada table shows the probability of developing or dying of oral cancer is ahead of stomach and pancreatic cancers, leukemia, and melanoma. In the United States, the oral cancer survival rate has remained relatively the same for the past 30 years.⁶ Oral cancer, normally considered a disease of the older adult, has begun to show an increase in incidence in the young adult population with the incidence still higher for males than for females.⁶

Osteoporosis is considered a predominantly female disease. As a part of women's health issues around aging, osteoporosis is related to postmenopausal conditions.⁸ The National Institute of Osteoporosis in the United States reports that, of the 10,000,000 people suffering from this disease, 80% are female. In Canada, the prevalence of osteoporosis among women over age 50 is estimated at 15.8%.⁹ Due to the debilitating nature of the disease, the cost to the health care system in Canada is over \$1 billion per year. Subsequent related bone fractures in senior years can lead to death due to incapacitation. While genetics is an important pre-determinant of osteoporosis,⁹ nutrition and physical activity play a major role in contributing to optimum bone density.¹⁰

Implications for oral health

Diabetes mellitus produces many changes in the body's immune system and its ability to fight disease. In diabetes mellitus, insufficient amounts of glucose enter the cell, resulting in higher glucose levels in the bloodstream. As a result, the body tends to metabolize fat stores rather than glucose for energy. The chronic elevated glucose levels can lead to complex reactions within the cells. These complex reactions create cross bonding and affect the body's ability to respond to disease and trauma. This leads to an increased susceptibility to infection and slower healing after trauma.¹¹ In terms of oral health, this translates into slow recovery at best or an inability to recover from periodontal disease. Chronic oral infection may itself lead to increased blood glucose levels, further complicating the diabetes mellitus. The oral cavity's ability to defend itself from the onset of periodontal disease depends to a large degree on the integrity of the structure and function at the gingival sulcus.¹² When an acute infection in the oral cavity presents itself, the treatment requires aggressive management.¹³ One of the compounding variables of diabetes mellitus is the higher risk for alveolar bone loss in poorly controlled diabetics.¹⁴ This further aggravates the oral cavity's ability to defend itself against the onset of periodontal disease. Unfortunately, the dental practitioner may not have participated on the diabetes mellitus management team and thus the oral complications of the disease may not have been part of the diabetes mellitus

education plan for the patient. Once compromised through diabetes mellitus, the immune system and the body's defences are severely impaired with little ability to rebuild and offset the disease process.

Oral cancer most frequently presents itself as squamous cell carcinoma. Pre-malignant lesions of leukoplakia and erythroplakia are present prior to the diagnosis of oral cancer.¹⁵ Treatment for oral cancer is aggressive and debilitating, often involving the removal of supporting mucosal tissue and possibly the jaw structure or segments of alveolar bone.¹⁶ The long-term effects of radiation or chemotherapy may result in partial to complete xerostomia.¹⁷ The accompanying increase in periodontal disease and caries becomes a challenging treatment problem for the dental hygiene practitioner.

Osteoporosis is generally associated with postmenopausal women. Oral health strategies for postmenopausal women are similar to all women with the exception of the concerns related to the disease of osteoporosis. While periodontal disease is insidious at any age, for women with osteoporosis, the disease is further complicated by the reduced density of the alveolar bone.¹⁸ Although there has been an increase in the number of adults retaining their teeth into their senior years, the relationship between osteoporosis and tooth loss is still in question. Bone density of the alveolar bone correlates to overall bone mineral density (BMD). When bone density is reduced, the progress of periodontal disease speeds up and the intensity of the disease increases. The interaction of periodontal disease with bone structure compromised by osteoporosis can contribute to premature tooth loss.¹⁹

With bone fragility accounting for fractures in the majority of postmenopausal women,¹⁹ the fragile nature of the jaw bone itself further complicates treatment of the client with osteoporosis. With bone fragility in the jaw structure, particularly the mandible, and the loss of supporting alveolar bone from periodontal involvement, the jaw structure becomes further limited in its ability to withstand stress. The pressure from scaling as part of routine periodontal therapy may result in a fracture of the mandible unless extreme care is taken, both in positioning the instruments and in using a fulcrum to stabilize the instrumentation.¹⁹

Nutritional management of these diseases

The background and education of the dental hygiene profession has included nutrition counselling as a part of overall dental hygiene care. Learning to integrate new and challenging problems with clients' dental hygiene treatment plans offers an opportunity for dental hygienists to incorporate more of the nutritional expertise that is already part of the dental hygiene practitioner's armamentarium. It would serve to enhance the overall education and health promotion concepts that have become synonymous with a dental hygiene treatment plans.

Diabetes mellitus requires nutritional management through a registered dietitian. In general, the diet requirements are for a healthy, low-fat diet. A correlation must exist between calories ingested, particularly carbohydrates, and the activities of daily living using those calories. Increased physical

Gender	Diabetic management of diabetic clients	Practitioner concerns related to gender perceptions
Male	• Follow the Health Canada food guide. • Eat small meals and snacks more frequently. • Monitor weight and maintain weight suitable for height [body mass index]. • Maintain or increase physical activity as per physician's instructions. • Limit alcohol intake.	• Perceptions of and concerns about fat intake are usually lower than female. • Interest in consumption of high fibre food is generally less than females; more encouragement is therefore required. • Consultation with the diabetic management team is necessary.^{2,14,21}
Female	• Same as for males	• While females tend to be more conscious of diet control, a review of dietary intake is important. • With the tendency for females to make healthier choices in high fibre foods, fresh fruits and vegetables, these choices need to be reinforced. • Consultation with diabetic management team is necessary.^{2,14,21}

Table 1. Diabetes mellitus and dietary management: concerns for the practitioner

activity is usually recommended. Meals should be carefully timed to ensure there are no low points in terms of glucose levels, as well as high points. Weight loss may be required to assure control of hyperglycemia.

For the dental hygiene practitioner, recognition of the dietary requirements of the clients who have diabetes mellitus is important. The American Dietetic Association has endorsed the need for oral health experts to provide additional baseline education in nutrition for diabetic clients. The links between oral and nutrition health requires practitioners in both fields to work together for optimum client care.²⁰ While clients diagnosed with diabetes mellitus are put through an extensive education program with their diabetic management team, male clients may actually require additional encouragement and support to control fat and carbohydrate intake based on the already identified gender perceptions of nutritional requirements. Women on the other hand may have to be encouraged not to cut out too many carbohydrates and in effect create low blood glucose levels.

Eating small amounts of food more frequently has been shown to control blood glucose levels most effectively.¹⁴ However, the basic dietary requirements should be formulated by a registered dietitian. Support and encouragement for compliance is an appropriate role for the dental hygienist. Recognizing the perceptions of nutrition based on gender helps to direct the support for the practitioner. Table 1 summarizes nutritional principles for male and female diabetic clients.

Oral cancer has not had the benefit of as much research in terms of nutrition and oral health as diabetes mellitus. However, the research has shown that a protein found in soybeans (the Bowman-Birk inhibitor) may actually shrink abnormal growths such as leukoplakia, a precursor to can-



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PROTEIN AND CALCIUM— A WINNING COMBINATION

The popular misconception that protein is detrimental to bones because it induces calcium loss persists, despite mounting evidence to the contrary and despite the fact that bone tissue is nearly 50% protein.¹

Roughead and colleagues compared the effects of several weeks of controlled high- and low-meat diets on body calcium retention.² Fifteen healthy, postmenopausal women consumed diets with ~600 mg of calcium (half the recommended DRI of 1200 mg), but either low or high in meat (45 g and 345 g, respectively), for eight weeks each in a randomized, crossover design. The low-meat diet provided 68 grams of total protein and the high-meat diet, 117 grams (12% vs 20% of energy as protein, respectively). After four weeks, calcium retention was similar for both diets.² Urinary calcium loss was unaffected by diet and did not differ between the two diets at any point tested.²

In another cross-sectional study of 136 healthy, postmenopausal women, a significant relationship between bone mineral density (BMD) and intake of energy, protein, calcium, magnesium, zinc and vitamin C was observed.³ Calcium, protein and energy (independent of one another) showed the strongest relationships with BMD at different skeletal sites. The higher the intake of both calcium and protein, the higher the BMD.³

These are just two small studies, but numerous others have also demonstrated that high-protein intake does not adversely affect calcium status, and thus bone health. In fact, epidemiological studies



Numerous studies support the importance to the skeleton of milk products with their highly absorbable calcium and high-quality protein.

indicate a positive effect of protein intake on BMD in elderly men and women,^{4,6} and possibly on fracture risk in postmenopausal women.⁷

According to expert Robert Heaney, “protein and calcium act synergistically on bone if both are present in adequate quantities in the diet, but . . . protein may seem effectively antagonistic towards bone (because of its calciuric effect) when calcium intake is low.”¹

While there are many vulnerabilities in the typical Western diet, too much protein is small potatoes compared to insufficient calcium. As long as there is adequate dietary calcium, protein-induced bone loss is a non-issue.

**Without adequate quantities of both
calcium and protein, the ability to build
new bone is jeopardized.**

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Categories of assessment	Diet summary for oral cancer client
Nutritional risk	1. Assess current nutritional status. 2. Identify nutrient needs by category. 3. Determine additional nutrient requirements.
Nutritional guidance	1. Identify nutritional needs in anticipation of treatment. 2. Identify nutritional needs in anticipation of loss of dental function.
Rehabilitation	1. For malnutrition resulting from cancer therapy. 2. For weight loss subsequent to cancer therapy.
Support	1. Identify network to assist in nutritional management; this network will vary based on the client's support needs.
Follow-up	1. Assess nutritional intake. 2. Adjust the nutritional plan to meet ongoing nutritional needs. 3. Identify problems occurring in nutrient consumption.

Table 2. Summary of nutritional assessment and requirements for the oral cancer client^{14,16,25,26}

cer.²² While the study reporting these findings was limited to a small number of patients, the results are encouraging. The Bowman-Birk protein needs to be used by a larger sampling of people with leukoplakia present.

Broader nutritional concepts have shown the need for antioxidants to influence the pathogenesis of oral cancer. Also, folate deficiency can lead to increased DNA damage, disruption of DNA, and diminished ability for DNA methylation.²³ Degradation of DNA supports and encourages cancerous growth. Although not a basic nutrient, increased alcohol consumption increases the odds ratio for oral cancer risk and reduces the ability to combat the disease once present.²⁴

A nutritional plan for oral cancer patients should include thorough nutritional screening to identify lifestyle factors that may influence the progress and development of cancer and nutritional rehabilitation. Table 2 summarizes nutritional concerns related to oral cancer patients.

Osteoporosis is a disease related to calcium loss. As such, the calcium required to maintain the hydroxyapatite structure of bone is 800 mg/day for males age 19–49 years and 700 mgs/day for females of the same age.¹⁹ However, for all adults over the age of 50, 800 mgs/day is the standard requirement. Within a client's health history, nutritional concerns such as lactose intolerance and food allergies may give some indication of whether this daily amount has been achieved.^{8,18,27}

In addition to calcium, the osteoporotic client requires vitamin D to regulate the absorption and metabolism of calcium. Vitamin D is absorbed through the gastrointestinal tract and has been known to enhance bone mass levels in children. Whether or not it is effective in long-term tooth retention for the patient already dealing with osteoporosis is yet to be seen. However, without the vitamin D, additional calcium in the diet will not affect the calcium levels or the bone mineral density (BMD) of the client. Recommended vitamin D levels are 2.5 µg/day for all persons aged 19–49 and 5 µg/day for anyone over the age of 50. These recommendations follow the Canadian guidelines for dietary intake. Where lactose intolerance is a problem for the client,

calcium-fortified foods and calcium supplements are another option for adults, particularly older adults with osteoporosis. The role of the dental hygiene practitioner is to determine the level of calcium the osteoporotic client is obtaining daily and reinforce recommendations to attain the standards set by Canadian dietary guidelines.

Summary

While the nutrition has always been a part of the course of study for dental hygienists, the increasingly complex delivery of service to clients and health care needs have increased the need to focus on nutritional requirements of the dental client. Gender perceptions of nutrition and nutritional requirements are diverse, with women more concerned than men about nutrition issues. Awareness that nutrition is related to oral health is only beginning in the general public. Many people still consider nutrition related only to total health. With increasing concern about specific diseases that affect oral health and the gender specificity of these diseases, it is important to share with clients current knowledge of nutrition as it relates to these diseases. The dental hygiene practitioner has the baseline knowledge related to nutrition and, with additional information, can continue to provide optimum health education to clients. The most current research findings indicate more complex nutritional needs when it comes to certain diseases and oral health. If we are what we eat, recognition of those special nutritional needs and the gender perceptions of nutrition offers the best possible care for the client.

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"WHAT'S IN A NAME?" (continued from page 3)

dental hygienists play in recognizing, educating, and assisting those who need it. But perhaps we are preaching to those who already know this.

We need to make our clients aware of the full range of our expertise, experience, and knowledge. Obviously oral hygiene counselling is an important part of our work but

there are many other areas in which we can counsel our clients about ways to pursue a healthier lifestyle. We inform people about the hazards of smoking, the impact it has on their life, and the various programs that are available for cessation and support. We can also recognize signs of substance abuse (drugs and/or alcohol) by conditions in the oral cavity and of the body overall and refer clients to the appropriate person or agency. Through careful conversation and by being aware of the overall appearance and behaviour of a client, a dental hygienist may suspect abuse—child, spousal, or elderly—and refer the client for evaluation and possible intervention, utilizing local support groups or agencies for assistance.

Other visitors to our offices are looking for advice concerning treatment suggestions and options or just an objective ear to hear about problems, sometimes related to oral health, sometimes not.

With such an attentive audience, we have the perfect opportunity to showcase our profession and educate our clients that we really do more than "clean teeth." Participating in continuing education, reading professional journals, and tapping into the wealth of resources on the Internet provide us with numerous ways of educating ourselves in the many aspects of dental hygiene, whether therapeutic or counselling. We can then pass along this education to our clients and the public. This issue of *Probe* contains valuable information on the relation of diet to oral health and general health so we can help our clients choose appropriate foods for both oral and general health.

So maybe the title "Registered Dental Hygienist" isn't broad enough. Perhaps we should be bold and change our title to "Oral Health Experts!" Most likely, the best that we can do is to educate the public on who we are and what we do and watch the evolution of dental hygiene continue.

Patty Wickstrom can be reached at <president@cdha.ca>.



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A Hygienist's Holistic Approach to Nutrition and Dental Health

by Jean LaMantia*

What do cheddar cheese, sugarless gum, and water have in common? They all help to reduce the chances of getting a cavity.

While oral hygiene and overall dental health are important in preventing cavities, it's also true that food will influence your clients' chances of getting a cavity. This is something that you can speak with your clients about when they come in for their check-ups.

A good place to start this discussion is to find out if your client understands how cavities are formed. Explain that the basic process goes as follows: bacteria living in the mouth break down sugar. This produces acids that then attack the tooth enamel, with each attack lasting about 20 minutes. The amount of sugar in the diet as well as the number of times per day the client eats sugar will influence the risk of developing cavities. The body's natural defence against acid attack is saliva. However, at night when saliva production is less, there is a greater risk for an acid attack. Finding out your client's understanding of this process and then filling in the blanks will help improve the client's understanding of dental health.

So, how do your clients reduce their risk of cavities? First, get rid of the acid. To do this, they should brush, floss, rinse with water, or chew sugarless gum after eating. For kids, a quick trip to the water fountain at school for a rinse will go a long way in helping to reduce cavities.

Ask your client: "Have you ever read the label on your package of sugarless gum?" Instead of sucrose (table sugar) as a sweetener, sugarless gum contains what is called a "sugar alcohol." These sugar alcohols include mannitol, sorbitol, and xylitol (names of sugar alcohols end in "-itol"). Mannitol and sorbitol do not promote tooth decay because they are able to prevent acid formation. Xylitol goes one step further—it will actually help to reduce the amount of plaque in the mouth. For this reason, products containing xylitol are allowed to carry a nutrition claim on the label: "Clinically proven to reduce cavities by up to 62% when used in conjunction with a proper oral hygiene program." So advise your clients that sugarless gum is a great item to have on hand after a meal when they don't have access to their toothbrush and floss.

Other foods that may be helpful include cheese, such as cheddar and mozzarella. The fat and casein in cheese are thought to protect teeth from the harmful acids. Other high-protein and high-fat foods such as meat, nuts, and legumes may also be protective. The fat in foods may help to reduce the stickiness and therefore reduce the amount of food stuck to the teeth.

So, what is the bottom-line message for your clients?

- Reduce the acid in the mouth after a meal by rinsing with water or chewing sugarless gum if brushing the teeth is not an option.
- Reduce the number of sweet treats throughout the day.
- Include some helpful protein foods at the meal.

As well as talking to clients about nutrition designed to prevent cavities, you can suggest other ways they can improve their knowledge of the basics of overall nutrition. Most children are taught about *Canada's Food Guide to Health Eating* (CFG) in elementary school and adults who attended school in Canada would also be familiar with it. However, nearly everyone would benefit from a review. Copies of *Canada's Food Guide to Healthy Eating* are available on Health Canada's web site at <www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/food_guide_rainbow_e.html>. Note that the guide itself is under review and clients can track the updating process at <www.hc-sc.gc.ca/nutrition>.

The whole focus of the CFG is to ensure that Canadians receive all the nutrients needed to maintain their health and prevent disease. If clients are "short" on grain products, they may not be getting all the fibre and B vitamins that they need. Running a deficit on fruits and vegetables? This could have long-term implications as the anti-oxidants found in fruits and vegetables will help prevent cancer and heart disease. This food group is especially important for those clients with a family history of heart disease or cancer. While a multivitamin-mineral supplement is a good safety net for everyone, it does not replace good nutrition.

Getting enough dairy products is important for all age groups as this food group is the richest in calcium and vitamin D. Thus, taking in fewer than the recommended 2-4 servings per day could have implications for **their** general health. Calcium is important for bone and tooth develop-

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ment; however, several new studies show that dairy calcium can also help in weight management. Those who do not receive enough calcium from their diet may have difficulty losing fat, especially from around the abdomen.

The final food group, meat and alternatives, is especially important for vegetarians. Since vitamin B12 and heme-iron (the form of iron that is absorbed more easily) are contained only in animal products, these nutrients are of concern for vegetarians. Vegetarians must make sure they are eating other iron-rich foods in the diet such as leafy greens and legumes. Vitamin B12 can come from fortified foods or supplements. Another important nutrient provided by this group is protein and sufficient protein can be ingested if meals are balanced properly. Some people become "vegetarian" but all they do is remove meat from their diet. They do not plan their meals properly to make sure they are getting a balance of all the other food groups—many vegetarians don't eat enough fruits and vegetables. So one cannot assume that vegetarians are necessarily healthier. They could also benefit from a referral to a registered dietitian for a discussion about good nutrition in general.

Your clients will benefit from your holistic approach to dental care and health. Asking clients about their nutrition will open the door for discussion of a variety of topics. When clients know that their dental hygienist shows an interest in their nutrition, they will know that nutrition is important for dental health as well as overall well-being.

For more information on preventive dentistry, check out the National Institute of Nutrition's article, "The effect of diet on dental health." For more information on vegetarian diets, look at the "Position paper on vegetarian diets," published in the *Canadian Journal of Dietetic Practice*.

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"EATING, ORAL HEALTH, AND GENERAL HEALTH " (continued from page 9)

bravo! But if you suspect the answer will be "no," then perhaps you could choose (as your New Year's resolution?) to educate your clinical clients regarding their food choices, eating habits, and health status.

Our authors this month come from a variety of health care fields: registered dietitians working in a large city hospital, a consultant firm, and a health facility; a nurse working as a diabetes educator for a First Nations tribal council; a pharmacist focusing on alternative medicine; and a dental hygiene educator. They all are very aware of the impact that good nutrition has on the population's oral health status and general well-being.

The articles suggest recommendations you can give your clients; review adolescents' eating habits and the corresponding impact on their oral health; touch briefly on the current food trends, including some well-known diets; discuss good nutrition in early childhood; examine diabetes, nutrition, and dental health among Aboriginal peoples; and talk about nutrition and gender differences in the context of gender.

We hope you will enjoy and benefit from this issue with its wealth of up-to-date, practical information on what food does for us and to us, and what dental hygienists can do to improve their clients' oral health outside of the clinical setting.

"L'ALIMENTATION, LA SANTÉ BUCCALE ET L'ÉTAT GÉNÉRAL DE SANTÉ" (suite de la page 9)

Vous pouvez être en mesure d'affecter le bien-être général de vos clients en les éduquant sur le lien entre le comportement dans le domaine de la santé et les résultats obtenus en santé buccale. Vos clients externes sont-ils conscients que la profondeur de vos connaissances et de votre expertise professionnelle va au-delà de l'expérience tactile qu'est leur rencontre habituelle avec vous? Bravo!, s'il en est ainsi. Dans le cas contraire, alors peut-être devriez-vous choisir (comme résolution du Nouvel An?) d'éduquer vos clients en clinique par rapport à leurs choix et à leurs habitudes alimentaires ainsi qu'à leur état de santé.

Ce mois-ci, les auteurs de nos articles viennent de domaines des soins de santé variés : des diététistes agréées travaillant dans un gros hôpital urbain, dans un bureau de conseillers et dans une institution de santé; une infirmière travaillant comme éducatrice en diabète pour un conseil tribal des Premières nations; un pharmacien qui met l'accent sur la médecine alternative; et une éducatrice en hygiène dentaire.

Ces collaborateurs sont tous très conscients des répercussions d'une saine alimentation sur l'état de santé buccale et sur le bien-être général.

Les articles proposent des recommandations à faire à vos clients; examinent les habitudes alimentaires des adolescents et les répercussions correspondantes sur leur santé buccale; abordent brièvement les tendances actuelles en matière d'alimentation, y compris certains régimes alimentaires bien connus; discutent d'une saine alimentation dans la petite enfance; examinent le diabète, l'alimentation et la santé dentaire chez les populations autochtones; et discutent de l'alimentation et des différences liées au sexe de la personne.

Nous espérons que ce numéro saura vous plaire. Également, que vous tirerez profit de sa mine de renseignements à jour et pratiques sur les effets des aliments, ? à la fois sur nous et pour nous ?, ainsi que sur ce que les hygiénistes dentaires peuvent faire pour améliorer la santé buccale de leurs clients, en dehors du cadre clinique.

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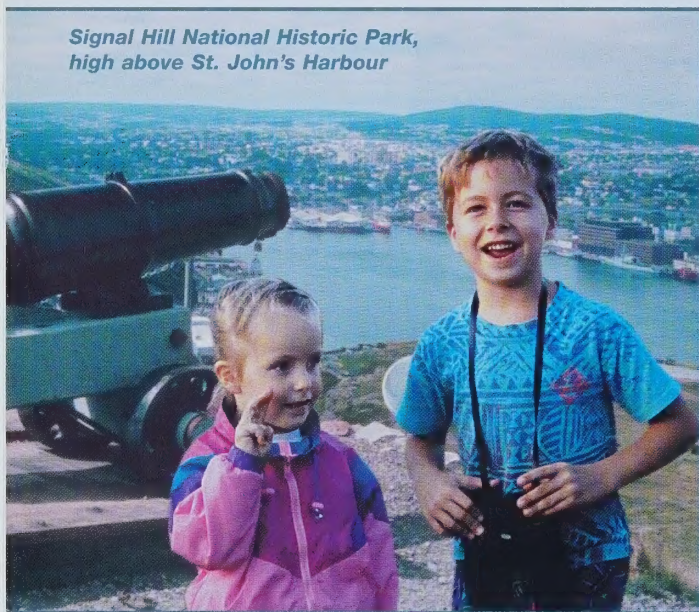
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ON BEHALF OF THE NEWFOUNDLAND AND LABRADOR DENTAL HYGIENISTS ASSOCIATION, WE INVITE YOU TO ST. JOHN'S, NEWFOUNDLAND FROM JUNE 25 TO 27 FOR THE CDHA 15TH ANNUAL PROFESSIONAL CONFERENCE

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Featured Highlights

Newfoundland and Labrador is abundant in history. In fact, there are a number of UNESCO World Heritage Sites to see throughout the province. Once the conference over, you and your family may wish to visit one of these spectacular locations.

GROS MORNE NATIONAL PARK of Canada displays the wonders of fresh-water fjords carved by millions of years of glacial activity—it is an awesome, beautiful sight. Enjoy hiking, camping, walking along the sandy beaches, sighting some of the 293 species of birds or 700 species of flowering plants.

Travel to another part of the island and walk in Leif Eriksson's footsteps at L'ANSE AUX MEADOWS. This site, the first cultural site in the world to receive the UNESCO World Heritage Site designation, contains the ruins of a Viking settlement from the 11th century, the only authenticated such settlement in North America.

Keynote Speaker



Ed Smith, a native of Newfoundland, still resides in Springdale with his wife. A graduate of Mount Allison University and Memorial University, Mr. Smith began teaching in 1966 and held various positions over the course of his career, including vice-principal and principal, assistant superintendent as well as principal of a local community college campus. At the encouragement of his wife, Mr. Smith also started writing a weekly humour column, which he did for 20 years. His articles and columns have appeared in such publications as the *Toronto Star*, *Reader's Digest*, and *Newfoundland Sportsman*. Mr. Smith has received many honours and awards, such as the award for excellence in broadcasting by the Canadian Nurses Association as well as an international Gabriel award for material "which inspired and uplifts the human spirit." Two and a half years after retirement, a severe car accident left Mr. Smith with a broken neck and quadriplegia. Four years later, he is still unable to walk. His seventh book, *From the Ashes of my Dreams*, follows his experiences during 18 months of hospitalization and rehabilitation in various centres in Newfoundland and Ontario.

With his renowned sense of humour, Mr. Smith will provide us with an uplifting and inspiring keynote address "You Might As Well Laugh," showing delegates the power of humour in overcoming life's challenges.



Ocean Sciences Centre (OSC)



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Courtesy of the Ocean Sciences Centre, Memorial University of Newfoundland

Preliminary Program at a Glance

Thursday June 24, 2004

4 p.m. to 7 p.m. Conference registration opens

Friday June 25, 2004

7 a.m. to 8 a.m. Conference registration
8 a.m. to 9 a.m. Opening breakfast
9 a.m. to 10:30 a.m. Concurrent scientific sessions
10:30 a.m. to 11 a.m. Nutritional break
11 a.m. to 12:30 p.m. Concurrent scientific sessions
12:30 p.m. to 2 p.m. Lunch and table displays; poster presentations

2 p.m. to 3:30 p.m. Concurrent scientific sessions
3:30 p.m. to 4 p.m. Nutritional break
4 p.m. to 5:30 p.m. Concurrent scientific sessions
Friday evening Free time

Saturday June 26, 2003

7 a.m. to 8:30 a.m. Conference registration
7:30 a.m. to 8:30 a.m. Continental breakfast
8:30 a.m. to 10 a.m. Concurrent scientific sessions
10 a.m. to 10:30 a.m. Nutritional break
10:30 a.m. to 12 noon Concurrent scientific sessions
12 noon to 3 p.m. Lunch and Exhibit hall
3 p.m. to 3:30 p.m. Nutritional break
3:30 p.m. to 5 p.m. Concurrent scientific sessions
Saturday evening Silent auction, dinner, and entertainment

Sunday June 27, 2003

9 a.m. to 11 a.m. Breakfast key note address and closing ceremonies

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PROBE

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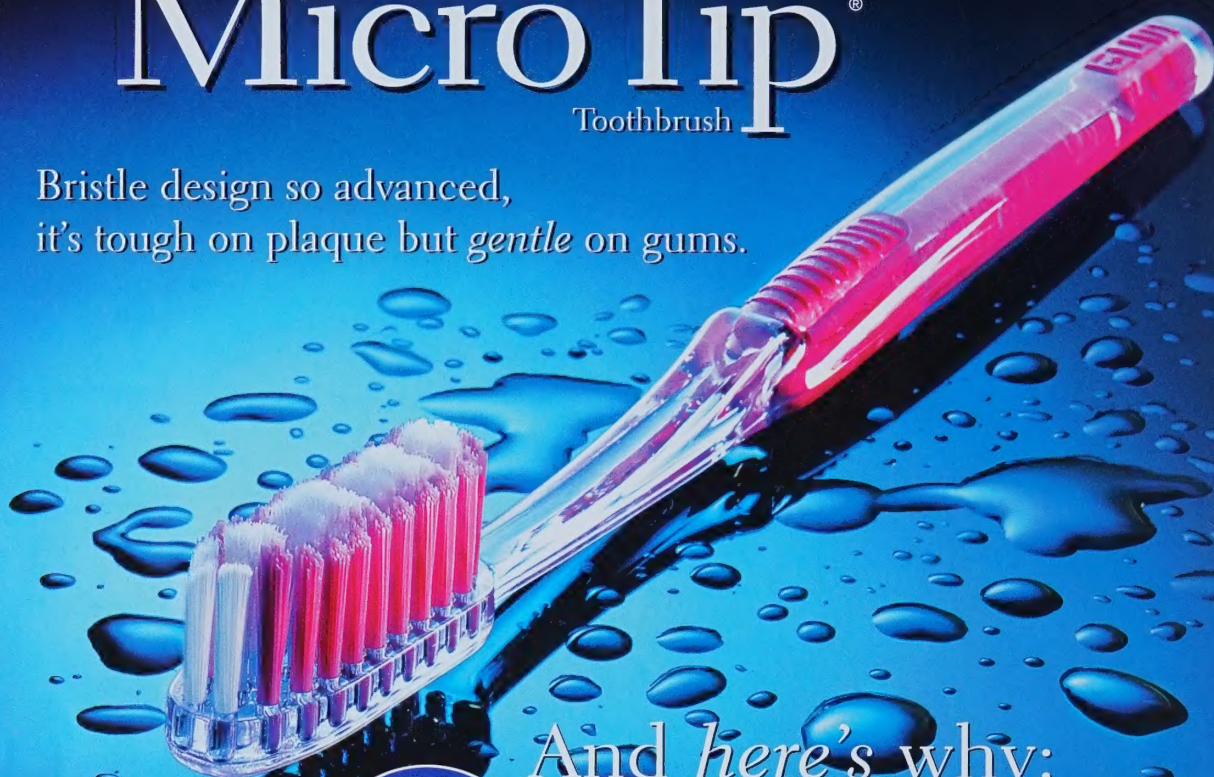
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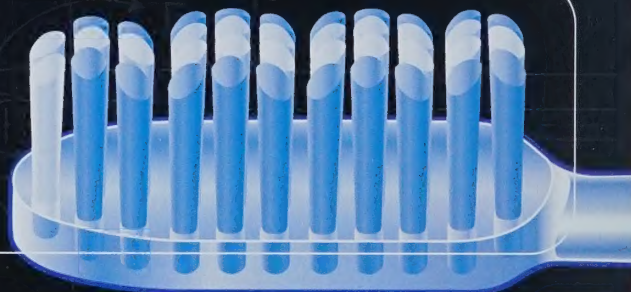
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PRESIDENT'S MESSAGE LE MESSAGE DE LA PRÉSIDENTE

We Need Your Help!

by Patty Wickstrom



The mission statement of the Canadian Dental Hygienists Association reads as follows: "The Canadian Dental Hygienists Association is the collective voice and vision of dental hygienists in Canada advancing the profession, supporting its members and contributing to the oral health and general well-being of the public." To be able to carry out our mission, we need a variety of current and credible documents with which to work. One of these documents is the CDHA Bylaws.

Now I know the subject of bylaws is not usually one to quicken the pulse or have you racing for a copy. But they are important although they reside in the background most of the time. Quite simply, bylaws are the rules that govern the association, its board of directors, and the members. It's the bylaws that state the composition of the board, its duties, and powers. Here also you will find out all about membership—categories, qualifications, and voting rights. And these bylaws have to be approved by you, the members of the association.

We need members' input to ensure that the bylaws meet the members' needs.

It was during the past year that the CDHA Board of Directors, while working on the association's policies, realized that the current bylaws were not explicit and more complex than necessary. This resulted in confusion of meaning.

Therefore in late summer 2003, CDHA retained the services of Association Xpertise Inc. (AXI) to prepare a brief background paper to help us consider possible amendments to the existing bylaws. The Board of Directors then held a teleconference with AXI during the board meeting in October 2003. During that conversation, some key issues were singled out for future thought and discussion. These included (1) delineating the reason for CDHA's existence, (2) defining the moral membership, (3) defining relationships, and (4) spelling out the values of the association. During the same teleconference, we also concluded that further input was needed to develop these issues. A stakeholder meeting hosted by CDHA and facilitated by AXI was held in Calgary

Nous avons besoin de votre aide !

par Patty Wickstrom

L'énoncé de mission de l'Association canadienne des hygiénistes dentaires se lit comme suit : « L'Association canadienne des hygiénistes dentaires est l'organisme qui agit comme porte-parole des hygiénistes dentaires du Canada et qui propose une vision propre à faire avancer la profession, à soutenir ses membres et à contribuer à la santé buccale et au bien-être général du public. » Pour pouvoir remplir notre mission, nous avons besoin d'une variété de documents à jour et crédibles avec lesquels nous puissions travailler. Les règlements de l'ACHD sont au nombre de ces documents.

Voilà bien un sujet qui, d'habitude, ne fait pas accélérer votre rythme cardiaque ou ne vous lance pas à la recherche du document. Mais, les règlements *sont* importants, même si la plupart du temps ils restent à l'arrière-plan. Tout simplement, les règlements sont les règles régissant l'association, son conseil d'administration et ses membres. Les règlements spécifient la composition du conseil d'administration, ses devoirs et ses pouvoirs. S'y trouvent également tout ce qui concerne les membres, — les catégories, les qualifications et les droits de vote. Et ils doivent faire l'objet de votre approbation, vous les membres de l'Association.

L'année dernière, la constatation suivante s'est imposée au conseil d'administration de l'ACHD, alors qu'il travaillait aux politiques de l'association : les règlements actuels étaient à la fois pas assez explicites et trop complexes, et qu'ils ne pouvaient qu'être source de confusion.

À la fin de l'été dernier, on a donc retenu les services d'Association Xpertise Inc. (AXI) pour préparer un court document de fond pour aider à l'étude des amendements qu'il y aurait lieu d'apporter aux règlements actuels. Ensuite, le conseil d'administration a tenu une téléconférence avec AXI, lors de sa réunion d'octobre 2003. À cette occasion, quelques points particulièrement importants sont ressortis pour réflexion et discussion ultérieures. Il s'agit de : (1) la description de la raison d'être de l'ACHD, (2) la définition du membership au sens moral, (3) la définition des relations, et (4) l'articulation des valeurs de l'association. Au cours de cette téléconférence, nous avons également conclu à la nécessité de consulter davantage pour élaborer ces questions. Une réunion d'intervenants, convoquée par l'ACHD et animée par AXI, s'est donc tenue à Calgary, le 31 janvier 2004. Y participaient les présidentes des associations

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WE NEED YOUR HELP! ...continued on page 93

NOUS AVONS BESOIN DE VOTRE AIDE ! ...suite page 84



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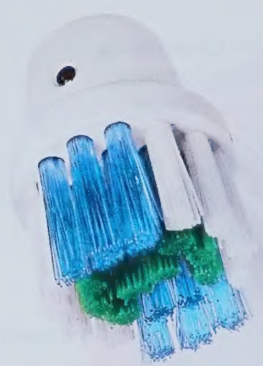
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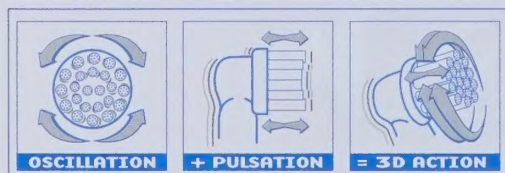


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EXECUTIVE DIRECTOR'S MESSAGE

MESSAGE DE LA DIRECTRICE GÉNÉRALE

The Collective Voice

by Susan Ziebarth,
BSc, MHA, CHE



The apparent insufficiency of every individual to his own happiness or safety compels us to seek from one another assistance and support. The necessity of joint efforts for the execution of any great or extensive design, the variety of powers disseminated in the species, and the proportion between the defects and excellences of different persons demand an interchange of help and communication of intelligence, and, by frequent reciprocations of beneficence, unite mankind in society and friendship.

— Samuel Johnson (Rambler #104, March 16, 1751)

CDHA's mission is "to be the collective voice and vision of dental hygienists in Canada advancing the profession, supporting its members and contributing to the oral health and general well-being of the public." As a "collective voice," CDHA strives to understand its members—their aspirations and needs—and to speak with the voice of intelligence.

Where does CDHA get the information from its members in order to speak on their behalf? Through various means:

**Do your part to
participate, share
your views**

- You comment directly through surveys (three since 2000).
- Your provincial representatives, dental hygiene educators, and registrars sit as board members and bring forward the views of their jurisdictions.
- Workshops or stakeholder consultations are held regularly. The CDHA *Code of Ethics, Dental Hygiene: Definition, Scope and Practice Standards*, and Research Agenda were all drafted by nation-wide committees drawn from different work settings. All dental hygiene stakeholder groups met in Calgary at the end of January to discuss the role of CDHA.
- Individual members write or call with their feedback and opinions, either spontaneously or with more formal comments on specific topics, such as position papers.
- In the coming months, you will be asked to comment on one paper examining the link between oral health and

THE COLLECTIVE VOICE ...continued on page 83

La voix collective

par Susan Ziebarth,
BSc, MHA, CHE

L'apparente insuffisance à laquelle chaque individu est réduit pour assurer son propre bonheur ou sa propre sécurité nous force à rechercher, les uns auprès des autres, assistance et soutien. La nécessité de déployer des efforts conjoints pour l'exécution de tout dessein remarquable ou étendu, la variété des pouvoirs disséminés dans l'espèce ainsi que la proportion entre les défauts et les excellences des différentes personnes exigent un échange mutuel d'aide et de communication d'intelligence ; et, par de fréquentes réciprocités de bénéfice, d'unir l'humanité dans la société et l'amitié.

— Samuel Johnson (Rambler #104, 16 mars 1751)

La mission de l'ACHD, est d'être « l'organisme qui agit comme porte-parole des hygiénistes dentaires du Canada et qui propose une vision propre à faire avancer la profession, à soutenir ses membres et à contribuer à la santé buccale et au bien-être général du public ». À titre de « voix collective », l'ACHD s'efforce de comprendre ses membres, — leurs aspirations et leurs besoins —, et de parler avec la voix de l'intelligence.

Où l'ACHD prend-elle l'information de ses membres afin de parler en leur nom ? Par divers moyens :

- Vous faites vos commentaires directement par le truchement des sondages (trois depuis 2000).
- Vos représentants provinciaux, les éducateurs en hygiène dentaire et les registraires siègent comme membres du conseil et font valoir les points de vue de leur champ de compétence.
- Des ateliers ou des consultations d'intervenants sont tenus régulièrement. Le *Code de déontologie* de l'ACHD, le document *L'hygiène dentaire : définition, portée et normes de pratique*, et le programme de recherche ont tous été rédigés par des comités d'envergure nationale dont les membres étaient tirés de différents milieux de travail. Tous les groupes d'intervenants en hygiène dentaire se sont rencontrés à Calgary, à la fin de janvier, pour discuter du rôle de l'ACHD.
- Les membres, à titre individuel, nous écrivent ou nous

LA VOIX COLLECTIVE ...suite page 82

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**Faites votre part pour
participer, partager
vos points de vue**



BONE CHINA



The Chinese typically consume less than 500 mg calcium daily, about one half of their Recommended Dietary Allowance.¹

According to a report by the BBC, there are very few dentists in China: only one for every 60,000 people.² That, plus generally poor dental hygiene habits – such as brushing with twigs and green tea – has had a seriously deleterious effect on teeth in that part of the world.²

Since bone loss affects the jaw, osteoporosis is yet another condition that puts Chinese teeth at risk. Although the myth persists that the Chinese are less likely than Canadians to develop osteoporosis, the incidence of hip fracture has increased three-fold during the last 30 years in Hong Kong,³ and by one-third during just four years in Beijing.⁴ Moreover, in contrast to North America, in China men are as likely to break a hip as women;⁵ and the incidence of

vertebral fracture is similar, or even higher.⁶ Low calcium intake has been identified as a major risk factor for hip fracture in Hong Kong Chinese, and is considered a major threat to public health in China.⁶

In a recent study in Malaysia, 200 healthy postmenopausal Chinese women were randomized either to follow their regular diet that included less than 500 mg of calcium/day or to consume at least 1,200 mg of calcium daily via 50 grams of high-calcium skim milk powder, taken as two glasses of milk each day. At two years follow-up, the milk supplement had significantly reduced bone loss at the total body, the lumbar spine, the femoral neck and at the total hip, compared to controls.⁷ In addition, there was a significant improvement in the serum 25-hydroxy vitamin D level in the milk-supplemented group. This study confirms the results of the only previous study using milk supplements in an Asian population of postmenopausal women. In that study, high-calcium milk effectively reduced bone loss, particularly at the clinically important sites of the lumbar spine and femoral neck.^{3,5} These studies failed to determine unequivocally whether the beneficial bone factor is simply the added calcium, or whether it's the milk-nutrient package of calcium, protein, vitamin D, phosphorus, magnesium and zinc.^{3,5,7}

The Chinese national committee for oral health has launched information campaigns to encourage people to use toothbrushes, buy toothpaste and visit dentists. The government has also introduced school milk programs to reduce the incidence of osteoporosis. Together, the two programs should improve dental health in China.

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GUEST EDITORIAL

Looking at "How are you?"

by Gladys Stewart, MSc, BA, RDH*

"How are you?" A usual greeting, but we should not forget how seemingly simple words can strongly affect others. In the dental hygiene profession, we work at developing our skills in interpersonal communications and choosing the most appropriate approach to clients in any given situation. When I became the patient/client a couple of months ago, I realized how very important those three little words can be to someone who is worried or in pain.

It was a brisk Saturday in January when I tripped in our garage and suffered a displaced and severe elbow fracture. Fortunately my husband could whisk me to a nearby sports medicine clinic within minutes. What happened and "how are you" was very easily managed at the admitting desk and with the doctor on call. In a short period of time, the staff took radiographs quickly and gently, gave me the diagnosis, put on a temporary cast, and started the process of booking the inevitable surgery. I was very pleased with the care I received.

My next visit and interaction was at a major hospital in Winnipeg and the interest in my health continued with "how are you" and messages of concern and care. The bad news was I would have to wait until Monday for surgery. However, I was once again fortunate as the orthopedic surgeon consulted was the "elbow expert" and I was reassured that I was in very good hands.

Monday morning, I arrived at the hospital at 8 a.m. to be admitted for emergency surgery. The orthopedic surgeon stopped by the admitting department to say, "Hello, and how are you?" and I was as relaxed as one could be waiting for surgery! A hospital volunteer (with a gaze from another day and no words to say) escorted me to the 4th floor. On the silent trip, I wondered why she chose to be a volunteer.

When I arrived at the nursing desk on the 4th floor, it was "Who are you" rather than "How are you?" Egad! My name was not on their admitting list! I did not have an appointment! After a couple of quick phone calls, a nurse escorted me to a locker room with a purple plastic bag. I was told to



undress, change into hospital attire, and given foam slippers (correct size!). After almost managing the task of undressing and dressing with my good right arm, I was told to wait in the TV waiting area with several other day surgery patients. I walked back to the desk to ask for a blanket to cover myself to help stop the painful shivers. Tears welled up in my eyes, but it was the wonderful visitors in the waiting area who asked, "How are you?" and provided comfort. I was later moved to a recovery room to wait for surgery and spent the next eight hours observing the recovery process of day surgery patients. Many hospital personnel had little interest in patient care and apparently lacked any interest in finding out how the patients were doing. I repeatedly heard "You have to pee" and "We are closed at 7 p.m." After hours of waiting, reflecting, and bearing the pain, I was transferred to the general surgery floor and the comfort of warm hands on my shoulder and the positive interactions of "How are you?"

So what happened to the 4th floor?

I do not need to be nice to her; I will not see this patient again.

It is just a fracture and the patient is not sick.

I am bored with my job and I am just not interested in her care.

We cannot waste time talking or we will never be able to close by 7 p.m.

Health care professionals occupy different work environments. Whatever the setting, the effect of this environment and personal interest are important factors influencing our patients' well-being. None of us wants his or her work environment—be it a dental office, a clinic, a school program—to resemble that cold 4th floor day surgery.

The words "How are you?" can be interpreted in various ways and different interpretations lead to different emotional reactions. The message we bring to others through the tone of our voice, our eye contact, our interest, and our care is a personal element that is an essential skill in our discipline of dental hygiene. We should examine how we communicate and look for the personal in even the most impersonal situations. There are occasions when we do not want to be personal—we are distracted, tired, busy, or just not interested. But we have to remember that the way we communicate with others can affect their feelings to a significant degree.

So how are you? 

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Smoking Cessation and the Dental Hygienist

CDHA is conducting a research review of smoking cessation and the role of the dental hygienist. Smoking is a major cause of cancer and heart disease and is implicated in periodontal disease. Dental hygienists play an important role in educating clients about the risks of smoking and recommending effective smoking cessation interventions. This review will highlight and analyze the most recent research on this topic and give some direction to dental hygienists regarding their role in smoking cessation. Watch for and comment on the draft paper through a web site consultation. If you would like to share some smoking cessation information or research, please contact Judy Lux at <jal@cdha.ca>. The finished review article will be posted on the CDHA web site and published in *Probe*. This project has been made possible with the generous support of Pfizer, makers of Nicorette and NicoDerm.

"Staying the Course: Literacy and Health in the First Decade"

Canadian Conference on Literacy and Health: Ottawa, October 17-19, 2004

The Second Canadian Conference on Literacy and Health will bring together learners, practitioners, and leading experts from across Canada to discuss the health of Canadians with low literacy skills. The conference is hosted by the Canadian Public Health Association (CPHA) and sponsored by the National Literacy Secretariat of HRDC. CPHA has set up an on-line discussion group to help shape the conference program. To learn more about the conference, visit <www.nlh.cpha.ca>. To become a member of the discussion group, e-mail <ichiarelli@cpha.ca>.

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"Access and Care: Towards a National Oral Health Strategy"

Symposium at University of Toronto, May 13-15, 2004

This symposium will offer a searching look at oral health policies in Canada. This is a timely and crucial examination for the following reasons: dentistry was not considered in the Romanow Report; there is no recent country-wide survey of Canadians' oral health status; future dental provider roles or requirements are virtually unplanned for; no national dental care program for children and expectant women exists; hospital-based dental clinics have been closed; public programs for seniors and children have been cancelled; extreme limits exist on dental coverage for the poor and seniors; employer-paid dental insurance is provided free of income tax consequences.

Provider groups, all three levels of government, community organizations serving those who have difficulties accessing oral health care, employers, and dental insurance carriers should plan to attend.

The symposium is hosted by the Toronto Oral Health Coalition, George Brown College, and the University of Toronto, and sponsored by CDHA, the Canadian Association of Public Health Dentistry, Health Canada, and the Ontario Association of Public Health Dentistry.

For more information and how to register, please contact Continuing Education, Faculty of Dentistry, University of Toronto, at 416-979-4902, ext. 7.

New Diploma Program in Dental Hygiene

The APLUS Institute of Technology, Healthcare and Business in Thornhill, Ontario, will open a new advanced Dental Learning Centre with a Diploma Program in Dental Hygiene in March 2004. The 18-month program combines academic study with supervised clinical experience, incorporating advances in technology and courses in the biomedical, dental, clinical, and behavioural sciences.

The Institute, in operation since 1996, is registered under the Private Career Colleges Act by the Ontario's Ministry of Training, Colleges and Universities, is a member of the Ontario and National Associations of Career Colleges, and is registered with the HRDC as an authorized training provider. It is at present non-accredited. More information can be obtained from their web site (www.aplusinstitute.com) or by contacting them at 905-907-8002.

New Brunswick activities —

National Dental Hygienists Week 2003

Raising awareness of the need for good oral hygiene and of the role of dental hygienists prompted various activities around the province during National Dental Hygienists Week in October 2003. In **Moncton**, dental hygienists attended career fairs at several high schools and visited a preschool/daycare in Dieppe, and toothbrushes were distributed to the Moncton City Hospital and the Extra Mural Hospital. In **Saint John**, the local dental hygienist group sponsored the Canadian Blood Services for NDHW, providing blood donors with toothbrushes and posters and distributing pamphlets explaining the role of dental hygienists. They also manned a booth at the Saint John High school career expo and generated a great deal of interest in the field. In **Fredericton**, a display was set up at the Fredericton Mall, displaying a "Happy Tooth" and a "Sad Tooth" with the foods that caused one or the other. One brave dental hygienist dressed up as the Tooth and certainly got a lot of attention, especially from the children! Children received toothbrushes, stickers, pencils, and colouring contest sheets from the CDHA web site. As well, local radio stations ran ads for six days on the importance of brushing and flossing. In the **Upper Saint John River Valley**, a radio campaign was carried on in Grand Falls.

Dental Hygienists' Preferences for Continuing Education Content and Delivery Formats

by Eunice M. Edgington,* RDH, MAEd,
and Sandra J. Cobban,** RDH, MDE



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ABSTRACT

As more health professions have become self-regulating, regulatory authorities have adopted mandatory continuing education (CE) as a mechanism for ensuring standards of practice. Over the last decade, health science information has expanded exponentially and it has become essential that dental hygienists have access to current health information to remain competent. The purpose of this study was to determine dental hygiene preferences for CE content and attitudes toward various delivery formats. Survey questionnaires were mailed to all 1,324 active members of the Alberta Dental Hygienists Association and 663 were returned for a 50% response rate. Respondents identified "to increase knowledge" and "to maintain competence" as the most important for pursuing CE, with mean scores of 5.98 and 5.78 out of 7 respectively. The significant barriers to CE were identified as the cost of the course and travel (59%) and work schedule conflicts (47%). CE methods most frequently utilized in the previous 12 months were lecture-based (98%), audiotapes (21%), and home study programs (14%). When asked to select preferred delivery formats, 25% indicated that all delivery formats were equally suitable, 69% selected videotapes, 60% web-based programs, and 53% selected paper-based correspondence. Eighty per cent of respondents own computers, 80% use e-mail, and 49% rate their computer skill level as intermediate or higher. The main topics of interest included alternative health practices, biopharmaceuticals and antimicrobials, health promotion, and evidence-based practice skills. Dental hygienists are interested in participating in non-lecture-based and web-based CE delivery methods. CE providers must develop programs/courses that cover the desired content and include access to web-based and computer-driven formats.

Key words: Continuing education, educational technology, distance education

INTRODUCTION

Health professions more and more are becoming self-regulating, and regulatory authorities are adopting mandatory continuing education (CE) as a way to determine professional competence and to ensure standards of practice.¹⁻⁵ Studies have shown that health professionals who pursue CE demonstrate a higher level of problem solving and leadership ability, and a higher degree of professionalism and job satisfaction.⁶⁻⁸ Mandatory CE requires the individual dental hygienist to upgrade his or her knowledge and skills and to provide evidence of participation in CE that is acceptable to the regulatory body.¹⁻⁴

The majority of dental hygienists, like physicians and dentists, work in single unit, private practices that typically do not have organized peer-review systems or professional networks that can assist them in determining their CE needs.^{9,10} These working environments often leave it to the individual to determine his or her specific learning needs and to select appropriate CE activities to meet them.¹¹ Selecting appropriate courses can be difficult, particularly when advertised CE course descriptions do not always accurately reflect the course content.²

Accessibility to appropriate CE activities can be hampered by the lack of a variety of CE formats, including computer-mediated programs. On-line dental CE courses available in the 1990s were very difficult to locate on the Internet and this made the information accessible only to people with well-honed computer retrieval skills.¹² Studies in the 1990s found that dental hygienists had low computer skills and did not often use computers for accessing professional information.^{10,13-15} However, over the last decade, computers have become standard equipment in most dental and medical offices in Canada and the United States.¹⁶⁻¹⁸

The emergence of the World Wide Web and the development of multimedia technologies have created corresponding opportunities for the development and delivery of computer-mediated CE health programs.¹⁸⁻²¹ Despite the rapid growth of the World Wide Web and computer technology, there continue to be limited numbers of computer-mediated dental hygiene CE programs available.^{22, 23} In Alberta, little

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is known about the attitudes of dental hygienists toward computer-mediated CE delivery. Are dental hygienists in Alberta ready and willing to accept computer mediated CE as a viable delivery mode? Do they have access to technical equipment that will facilitate a variety of electronic CE formats? This study will attempt to answer these questions.

The purpose of this study was to identify dental hygienists' willingness to participate in various CE formats. It also sought to identify dental hygienists' access to computers and the technical capacity to receive various electronic CE formats, and to identify their perceived learning needs with respect to content, interest, and attitudes.

LITERATURE REVIEW

There is an identified shortage of relevant, accessible, and professional CE programs.^{2,15,24} Cost, distance, high registration fees, overnight stays, and incongruent objectives and content are most often cited by health professionals as reasons for not attending programs.^{2,24} Covington and Craig concur that geographic isolation, time away from families, subject matter relevance, quality of the course, and the cost are barriers cited by dental hygiene respondents.¹⁰ Symposia and conferences are the primary continuing education activity for the majority of health care professionals.²

Studies in the early 1990s investigated the information-seeking patterns of dental hygienists and found the preferred methods of accessing information included discussions with colleagues, printed information sources such as journal articles, mailings from professional associations, and "live presentations."^{10,13-15} In all of these studies, electronic formats such as audio- and videotapes, Internet, computer-based instruction, and CD-ROM were the least used formats.^{10,13-15} Covington and Craig's study revealed that 40% of dental hygiene respondents reported little or no computer skills.¹⁰ Gravois et al. found that 65% of dental hygiene respondents owned or had access to computers but a very small percentage (3%) used them for seeking professional information.¹² Although identifying access to on-line CE was not the purpose of either of these studies, the findings appear to suggest that barriers to on-line CE could include a lack of technological skill and a lack of on-line CE courses.^{10,13-15} It must be noted that these studies had small samples sizes from narrow geographic regions.

The emergence of the World Wide Web in the early 1990s and the development of multimedia technologies over the last decade created new opportunities for the development and delivery of CE health programs.¹⁸⁻²³ One medical study that investigated the information-seeking habits of primary and hospital physicians found that most participants had computers in their offices. Primary care physicians in single unit practices reported that the Internet was a very important mode of keeping up to date with their profession.⁹ Similarly, in 2000, a dental study revealed that 64% of the dentist participants' accessed on-line dental CE through Internet connections from their offices, 31% from home and 3% from a library.¹⁶

Cobban's 2002 study of Canadian dental hygienists' access to electronic media revealed that 70% of respondents had a computer in their home and over half of these had Internet access. The majority of respondents in this study also indi-

cated they were comfortable using the computer and email.⁷ Finley-Zarse and others investigated the information-seeking behaviours of practising dental hygienists and full-time dental hygiene educators.²⁵ The results of this study showed that while both dental hygiene groups used traditional information sources as the primary resource for professional information, dental hygiene educators used computer sources at a higher frequency than did the dental hygiene practitioners. Even though practitioners showed a lower rate of use than did educators, a substantially greater percentage of dental hygiene practitioners used electronic information sources than was recorded in earlier studies.²⁵

The move of medical and dental offices to a greater reliance on computers has required health care personnel to attain more technical skills in order to function on a daily basis.¹⁶⁻¹⁸ Increased user-comfort and exposure to computer technology has been shown to lead to a greater increase in the acceptance of the computer as a teaching and learning tool and as an education delivery format.²⁶⁻²⁸ In contrast, Francis and others found that dental participants' enthusiasm and acceptance of on-line continuing dental education (CDE) programs was independent of computer experience or Internet skills.¹⁹ A majority of dental participants in this study indicated they would choose this option again and would refer the course to other dental professionals.¹⁹

Despite the rapid change in multimedia technology, traditional lecture-based education continues to be the primary delivery format for formal and continuing education in Canada. A recent study showed that although a number of dental hygiene programs in the United States utilized computer delivery formats (22% of all degree and degree-completion programs), only one program had developed courses specifically for CE.²² Evaluation of this one program indicated that the majority of dental hygiene participants were satisfied with computer delivery as an alternative to classroom education.²² A four-year comparison study of face-to-face delivery versus computer-delivery dental hygiene education showed that learners at both sites performed equally well.²³

As computer-mediated formal education gains more momentum, there is a corresponding move toward computer-mediated CE program development.¹⁹⁻²¹ By understanding the current technical skill levels of dental hygienists and their willingness to participate in a variety of multimedia CE delivery formats, CE developers in Alberta will be better prepared to develop appropriate computer-mediated CE formats. The availability of a variety of delivery modes will afford greater opportunities for dental hygienists to select CE courses that are consistent with a variety of learning preferences.

METHODS

The survey research design was chosen to describe characteristics of a given population and to give participants an opportunity to indicate preferences on a number of variables. The population for the study was the membership of the Alberta Dental Hygienists' Association (ADHA), which consists of all dental hygienists in Alberta who are licensed to practise. A mailed questionnaire was selected to provide all active members of the association with an opportunity to participate. The survey instrument used in this study was

developed based on the barriers, accessibility issues, motivating factors, and content preferences identified in a previous study conducted by the Faculty of Pharmacy at the University of Alberta.²⁹

This survey was delimited to active members of the ADHA, as all were within the same regulatory jurisdiction and would likely access CE from similar sources. The total population of active dental hygienists registered with the ADHA were included in the survey, to ensure that a sufficient number of responses were received for confidence in the data.

One limitation of survey research is the inherent bias in the potential for non-response; consequently, mechanisms were implemented to reduce any potential effect of this bias. Two different potential types of non-response bias have been identified in the literature—unit non-response and item non-response.^{30,31} To reduce the potential for item non-response, the survey questionnaire was reviewed by practising dental hygienists to determine the clarity of the questions, readability, and ease of completion. It was pre-tested on a convenience sample of 10 practising dental hygienists who were clinical instructors in the U of A's dental hygiene clinic. Minor adjustments to increase item response were made to the instrument following the pre-test, prior to mailing.

Unit non-response refers to the unit of analysis, in this case the individual respondent. Some studies have found that responders tended to have higher academic qualifications.^{29,31} Barriball and While's study of views and perceptions related to continuing professional education found that regular CE attendees were more likely to respond.³⁰ The nature of non-response phenomena is very complex, and most authors agree that careful attention to detail in the study design can reduce both unit non-response and item non-response,³⁰⁻³⁵ consequently reducing bias in the results. Both unit and item response were addressed in this study design.

Ethical approval to conduct this study was received from Health Research Ethics Board Panel B at the University of Alberta. Funding for this study was received from The Fund for Dentistry Grant Number 2000-13. The survey questionnaire was mailed to 1,324 active members in June 2002 with a July 15 return date. Pre-addressed return envelopes were included in the mailing to reduce unit non-response. There were 663 completed questionnaires returned within the time frame of this study, for a response rate of 50.2%. Nine envelopes were returned as the addressee had moved, and seven questionnaires were received too late to be included in data entry. To protect the confidentiality of respondents, questionnaires were anonymous and were returned to a third-party research assistant.

Data from the 663 questionnaires that had been received within the time frame of this study were entered into the Statistical Package for the Social Sciences (SPSS) software program and analyzed using descriptive statistics, including frequencies and measures of central tendency.

RESULTS

Over 60% of respondents were under the age of 40 years, with the largest group of respondents (19.8%) aged 30 to 34 years. A further 17.9% were aged 25 to 29, and 17.3%

Age	N =	%	ADHA members %
24 or under	38	5.7	5.8
25 to 29	119	17.9	18.6
30 to 34	131	19.8	19.3
35 to 39	115	17.3	17.5
40 to 44	109	16.4	14.8
45 to 49	94	14.2	13.9
50 to 54	37	5.6	5.9
55 to 59	19	2.9	2.9
60 or over	1	0.2	1.3
Total	663	100.0	100.0

Table 1. Frequency distribution of age of respondents and age of ADHA member population

were aged 35 to 39. Table 1 shows the frequency distribution of respondents by age categories. A further column has been added to this table to include the age distribution of the Alberta Dental Hygienists' Association (ADHA) members. Comparing the distributions of respondents to members illustrated that the respondents were representative of the total membership for the characteristic of age.

The majority of respondents (53%) had been registered to practise in Alberta for 10 years or fewer, with 29.6% practising for fewer than 6 years and 23.4% practising for 6 to 10 years. This compared with 29.6% and 14.3% respectively for the membership, suggesting that the respondents who have been practising for fewer than 6 years were representative of the membership for that characteristic. It was not possible to compare number of years registered in Alberta for respondents and members beyond 10 years as the study data and ADHA's membership data were not captured in a consistent format.

The majority of respondents (79.5%) held a dental hygiene diploma, 17.2% held an undergraduate degree, 2.4% held a graduate degree with 0.3% holding a PhD. This characteristic differed slightly for the general membership, with 65.8% holding a diploma, 31.7% holding an undergraduate degree, 2.3% holding a graduate degree with 0.2% holding a doctorate.

Respondents were geographically distributed through differing community sizes, with 101 or 15.3% from communities with fewer than 10,000 population, 205 or 31.2% from communities between 10,000 and 100,000, and 352 or 53.5% from communities with a population of 100,000 or more. In Alberta, Edmonton and Calgary represent the communities with populations greater than 100,000, suggesting that the majority of respondents come from these communities.

The majority of respondents (94.3%) indicated they currently practised in clinical practice settings, with 5.4% indicating community health, 3.5% indicating educational settings, 0.5% indicating consulting, 0.3% indicating administration, a further 0.3% indicating a hospital setting, and others indicating health promotion (0.2%) and speaker (0.2%). As 4.2% of respondents indicated multiple practice settings, this total will be greater than 100%. Over half (55.4%) of respondents indicated they were employed full-time, 41.3% were employed part-time, and 1.4% indicated they were employed on an occasional basis. A further 11 respondents (1.7%) indicated that they were unemployed but wrote in the margin of the questionnaire that they were on maternity leave.

Reason for participating in CE	Mean ranking
To increase knowledge	5.98
To remain competent	5.78
For self-improvement	5.54
CE is mandatory	4.64
To secure professional advancement	3.36
To network with colleagues	3.32

Table 2. Mean rankings for statements that best describe why respondent participates in continuing education

The mean number of continuing education (CE) activities attended by respondents in the previous 12 months was 4.7, with a mode of 3 and a median of 4. Respondents were asked to rank reasons for participating in CE using a scale of 1 to 7 to describe perceived importance. Mean scores were calculated for the rankings. Respondents could also choose "All of these are of equal importance." Two hundred and eleven respondents (31.8%) indicated that all reasons were of equal importance. For those who ranked the other choices in order of importance, "To increase knowledge" received the highest mean score at 5.98, followed by "To remain competent" at 5.78. Table 2 illustrates the reasons and mean scores for the rankings (excluding "all reasons are of equal importance.") Cross-tabulation of the variables "number of CE activities attended" and "population size of home community" showed little difference between the number of CE activities attended by those living in large or small communities.

Respondents were asked to rank order a set of statements (using a scale of 5) to indicate their attitude toward continuing education. They could also choose to respond, "All of these are of equal importance." Four hundred and sixty-six (70.3%) responded that all were of equal importance. Of the remaining statements, "Health consumers have a right to expect dental hygienists to upgrade their knowledge and skills" was ranked the highest with a mean ranking of 4.05 on a scale of 5. Table 3 displays the attitudinal statements and their mean rankings.

Statement	Mean ranking (scale of 5)
Health consumers have a right to expect dental hygienists to upgrade their knowledge and skills	4.05
CE participation is an ethical responsibility	3.70
CE participation by dental hygiene professionals upgrades the profession	3.50
Mandatory CE is beneficial to the profession	3.32

Table 3. Mean rankings of respondents to a set of attitudinal statements

Respondents were also questioned about barriers or obstacles to their participation in continuing education programs. Respondents could check any of six stated obstacles that applied or could write in any other(s) that they experienced. Percentages will add up to greater than 100% to account for multiple responses. The most frequently identified obstacle was "Cost of course/travel," identified by 393 respondents (59.3%). Other obstacles included "Conflict with work schedule," identified by 311 respondents (46.9%), and "Topic is not relevant or interesting" (306 or 46.2%). Table 4 displays the frequency distribution of responses for the obstacles specified in the questionnaire. Twenty respondents indicated "Other," with six (0.9%) indicating "Not conve-

nient," four indicating that their maximum CE credits had been obtained, three indicating "Topics not current," and several single responses indicating "Lectures are non-interactive," "Unaware of options," and "Lack quality CE."

Nineteen percent of respondents had 100% of their CE expenses paid by their employer while 37.7% did not receive any assistance from their employer for continuing education expenses. The remainder fell between with 8.7% having from 0%–24% of expenses paid by their employer, 6.9% having 25%–49% paid by their employer, 16.1% having 50%–74% paid by their employer, and 10.6% having 75%–99% paid by their employer. Twelve respondents indicated that they had access to professional development funds through their place of employment.

Specified obstacle	n =	%
Cost of course/travel etc.	393	59.3
Conflict with work schedule	311	46.9
Topic not relevant or interesting	306	46.2
Conflict with family commitments	250	37.7
Lack of accessible CE	184	27.8
Lack of time	169	25.5

* Note that respondents could choose multiple options so percentages will total more than 100

Table 4. Frequency distribution of responses to specified obstacles

Respondents were asked to indicate the types of CE delivery they have previously participated in, checking all that applied from a list. The most frequent response was face-to-face workshops/presentations with 649 or 97.9% of respondents checking that response, followed by audiotapes with 137 or 20.7%. Table 5 lists the frequency of responses for each choice. Low responses for videoconferencing and telephone conferencing may be related to the low availability of these delivery methods and therefore should be viewed with caution.

Respondents were then asked to indicate the preferred months for participating in continuing education activities. Again, respondents could select multiple choices. The responses for preferred months for continuing education activities were October (79.8%), March (78.4%), November (72.4%), February (70.1%), and April (68.5%). January and September had responses of 55.1% and 53.2% respectively. Not surprisingly, August (12.1%), July (12.7%), and December (15.1%) were the least preferred months.

Respondents were asked to rate their preferences for "live" delivery formats for continuing education using a 5-point scale. They could also select "All of these are acceptable," and

Continuing education activity type	n =	Frequency %
Face-to-face workshops/presentations	649	97.9
Audiotapes	137	20.7
Home study programs (paper format)	91	13.7
Videotapes	49	7.4
Computer courses	34	5.1
Web-based courses	25	3.8
Videoconferencing	17	2.6
Telephone conferencing	9	1.4

* Note that respondents could choose multiple options so percentages will total more than 100

Table 5. Frequency of participation in various types of continuing education activities

287 or 43.3% did so. The remaining respondents' choices in order of preference were lecture with participation, lecture, case studies (problem-solving approach), interactive scenarios, and small group discussion. Only three respondents indicated they would like "other" delivery formats, but did not specify.

Respondents were then asked to select from a list of distance delivery methods for continuing education those in which they would be interested in participating. Again they could choose the option "All are equally acceptable" and 156 or 23.5% selected it. The order of preference for the remaining options was home study videotapes (343 or 51.7%), on-line computer-assisted programs (298 or 44.9%), correspondence courses (paper format) (266 or 40.1%), packaged computer-assisted programs with printed documents (216 or 32.6%), home study audiotapes (187 or 28.2%), and videoconferencing (76 or 11.5%). Twenty respondents (3.0%) chose "other" and specified live and interactive.

Given that one of the intents of this study was to determine dental hygienists' willingness to consider alternate delivery formats for continuing education, it was important to investigate their access to and familiarity with computers and software. Of the respondents, 567 (85.5%) reported owning a computer with 43.3% of the computers less than two years old and a further 21.6% being three years old. Two hundred and seventy-three (45.6%) had a telephone modem and 233 (38.9%) had a cable modem. The majority of respondents (379 or 67.1%) reported using Internet Explorer as their browser with 139 (21.0%) using Netscape. Slightly less than half of respondents (46.2%) self-reported their computer experience as "beginner," with 41.5% self-reporting "intermediate skill," and 7.5% self-reporting "very skilled." The remaining 4.8% classified themselves as having "no experience."

When asked to indicate their immediate feelings about on-line web-based continuing education by checking any responses that applied from a given list, 65.4% of respondents indicated they were "receptive to the idea" and 192 or 29.0% indicated they would "enjoy the challenge." Ninety respondents (13.6%) felt they "don't have the skills to do it" while 29 or 4.4% felt "it would take too much time to learn how to do it." A further 90 respondents (13.6%) chose the response "I don't know." Percentages may add up to greater than 100% as respondents could choose multiple options.

As the purpose of this study was to investigate preferences for content as well as delivery, respondents were asked to rank their top five choices from a list of possible topics for continuing education. They could also add other topics if they chose. Topics chosen in order of preference were as follows: product information and recommended usage; alternative medicine/herbal medicine; biopharmaceuticals and antimicrobial therapies; current health promotion issues; anesthetic/contraindications; how to improve skills in evidence-based practice; aging and related conditions; neuromuscular conditions (MS, CP, ALS, etc); how to search for dental hygiene topics on the web; client-centred care communications; management of special needs clients; ethical issues; developmental conditions; mental illness; and different practice business plans. Other areas of interest as specified by respondents included current periodontal treatment strategies, degree completion on-line, oral health research,

technical workshops, pediatrics, practice management, medical emergencies, pharmaceuticals, and radiation protocol.

DISCUSSION

Comparing these survey findings with the ADHA registration data shows that respondents in this study were representative of the hygienists in Alberta for the characteristics of age, and years of practice fewer than 10 years. It was not possible to compare beyond 10 years. Respondents differed somewhat for the "characteristic of education" credential, with a greater number of respondents with an undergraduate degree than were found in the total population of hygienists in Alberta. More than half of the respondents were from major urban centres, Calgary and Edmonton.

The overwhelming majority of respondents (94.3%) were currently employed in clinical practice settings. Working in isolation from peers increases the responsibility to determine their learning needs and to develop their own learning plan.^{9,11} Respondents were most likely to have attended three CE activities in the previous 12 months, although the questionnaire did not ask the number of hours of each activity. All of the stated reasons for participating in CE were considered equally important for 31.8% of respondents. The remainder responded that they attended CE primarily to increase their knowledge and to remain competent. In Alberta, dental hygienist registrants (whether active or inactive) are required to achieve a minimum of 75 credit hours of continuing education in a given five-year period. Supporting documentation must accompany their application for approval of the continuing education (CE) courses taken and all courses must be relevant to their professional practice.⁴

Most hygienists had similar attitudes to continuing education with 70% ranking all statements from the given list to be of equal importance. The remainder ranked "Health consumers have a right to expect dental hygienists to upgrade their knowledge and skills" as their top choice. This is consistent with literature that shows there is growing awareness of the public and their expectation for quality care.^{5,36}

The most frequently identified barriers were the cost of the course/travel, conflict with work schedules, and a perception that the topic was not relevant or interesting. This is consistent with studies in other professions.^{2,24} Respondents from smaller centres, with populations fewer than 10,000 (43.5%), were more than twice as likely to perceive a lack of accessible CE as a barrier than respondents from larger centres with populations greater than 100,000 (19.9%). To determine whether these differences were significant, the chi square test was used. Chi square analysis using a three (location) by two (perception of barrier) contingency table revealed a significant relationship between population size and perception of lack of access to CE (χ^2 27.61, df 2) for a 99.5% confidence level. This suggests the need to consider alternative delivery mechanisms such as computer-mediated strategies. The majority of respondents prefer to attend CE activities in October and November, February, March, and April. Expanding to alternative forms of delivery would increase flexibility of access for those who prefer other times of the year. This information could be very useful for planners of CE programs.

Nearly half of the respondents found a broad spectrum of "live" delivery formats acceptable. Further to this, 23.5% of respondents found all options from a specified list of distance delivery methods to be equally acceptable. The top preferences were home study videotaped courses, on-line computer programs and correspondence courses (paper format). This finding suggests that responding dental hygienists are interested in a greater range of delivery formats than is currently available in Alberta. The majority of respondents were receptive to the idea of web-based continuing education delivery.

The majority of respondents (85.5%) owned a computer and 65% of the computers being fewer than three years old. The technical capability of the newer computers enables faster access to a broader range of delivery formats. The type of modem connection to the Internet will have an impact on the range and use of different delivery formats. In this study, 45.6% had telephone modem connections, which would mean that course designers would have to design CE courses with this limitation in mind. Nearly half of the respondents (49%) rated themselves as having an intermediate or a high level of computer skills and only 4.8 % reported no computer experience. This represents a dramatic change in dental hygienists' computer use and skill from that found in previous studies.^{10,11,14}

It is clear that the trend toward electronic CE delivery is here to stay. The conventional lecture format for CE, although acceptable, is less flexible and less adaptable to the learning needs, styles, and thinking of the individual.^{16,37} CE facilitated through a wide range of multimedia instruction technologies has been shown to be as effective, if not more effective, than face-to-face learning in providing rich learning opportunities and in student achievement.^{22,23,38} Computerized delivery formats enable multiple learners to engage in analysis, synthesis, and discussion of the information at hand, which leads to a deeper understanding of the meaning of the content.³⁸ Multimedia computer-based delivery formats can accommodate many different learning styles. Text-based software with hyperlinks to topic-related sites are suitable for those who learn best by reading. Recorded presentations viewed on a computer are appropriate for auditory learners while written text with interactive visuals and illustrations emphasizing key points of interest provide a range of options for participants who enjoy a variety of learning approaches.³⁷

CE programmers must consider the expressed wishes of the target audience when selecting and developing the content of future CE programs. This study investigated preferences for content and found that the top six choices were product information and use, alternative/herbal medicine, biopharmaceuticals and antimicrobial therapy, current health promotion issues, anesthetic/contraindications, and how to improve skills in evidence-based practice. CE providers are challenged to develop programs to meet the identified needs of health professionals in order to provide the knowledge they are seeking.

CONCLUSION

In the early and mid-1990s, several studies identified that dental hygienists were not eager to pursue computer-based CE delivery formats.^{10,14} Reasons for the lack of enthusiasm

may have included the lack of exposure to multimedia technology, the lack of accessible and appropriate computer-mediated CE programs, and the lack of computer experience.

However, these issues were not addressed. Recent research on dental hygienists' exposure and use of computers demonstrates a marked increase in their comfort with electronic technology and a greater acceptance of the media as a delivery format.^{6,25}

Computer interest and computer anxiety has been demonstrated to be associated with length of exposure and level of skill with technology.²⁶⁻²⁸ The literature also supports that computer-mediated delivery mechanisms are effective in appealing to a wide variety of learning styles.³⁸

This study has clearly demonstrated that Alberta dental hygienists are comfortable using computers and desire access to computer-mediated CE programs. Program developers and providers should be utilizing this medium for the delivery of dental hygiene CE programs.

ACKNOWLEDGMENTS

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DENTAL HYGIENISTS' PREFERENCES ...continued on page 90



Canadian Advisory Board on Dentin Hypersensitivity

Dentin Hypersensitivity

Closing the Knowledge Gaps

The high prevalence of dentin hypersensitivity, combined with continued underreporting and underdiagnosis, has intensified the need to focus on the management of this condition. Responding to that need, the Canadian Advisory Board on Dentin Hypersensitivity, a committee representing a broad range of dental care specialties, convened to determine best-practice recommendations.¹ Collectively, they evaluated the scientific evidence as well as condition-related knowledge gaps that were identified by an extensive national survey of 8,000 dental professionals (7% response rate). By contributing their own diverse expertise, the committee produced the first ever "Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity," to provide direction to the dental care profession.



Gordon Schwartz,
DDS, PhD, Dip Perio



Véronique Benhamou,
DDS, Cert Perio

Gathering evidence: the foundation for a consensus.

The Canadian Advisory Board on Dentin Hypersensitivity began its task by gathering information from two key sources. A thorough search of literature, articles and reviews from 1966 to 2002 was conducted to provide the available scientific evidence; while a large, national, multi-disciplinary survey revealed current clinical knowledge and practices. This Educational Needs Assessment Survey, sent to 5,000 dentists and 3,000 dental hygienists, was implemented to determine practitioners' understanding of the

mechanisms and management of dentin hypersensitivity.

The results of the 66-item questionnaire highlighted 14 key knowledge gaps spanning diagnosis, management and treatment, reflecting the limited emphasis on dentin hypersensitivity in the curricula of dental and hygiene schools. The following present some of the identified misconceptions:

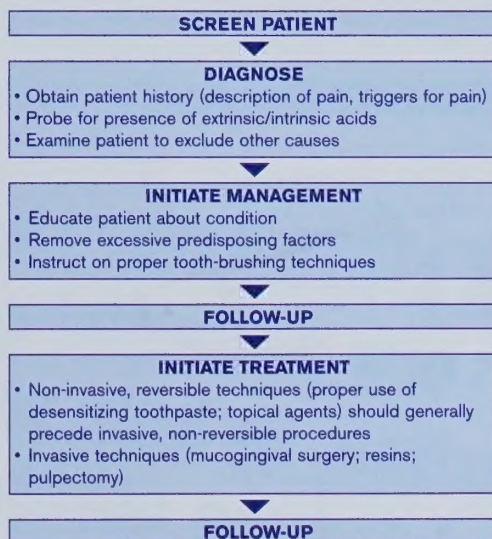
- Practitioners underestimated the prevalence of this condition, particularly among young adults.
- Screening was not a primary consideration, putting the onus on patients to initiate conversation about their sensitivity concerns.
- Although dentin hypersensitivity is by definition a diagnosis of exclusion, less than half of the practitioners attempted to exclude other diseases.
- When identifying causes, few professionals knew that enamel erosion is the primary factor leading to dentin hypersensitivity, with 60% incorrectly identifying gingival recession as the primary cause.
- Over 85% incorrectly cited toothbrush abrasion as the reason for continued tubule exposure, even though toothbrushing, with or without toothpaste, has no significant effect on tubule exposure.
- Treatment strategies varied greatly, with only 50% responding that they attempted to modify predisposing factors.
- Over half of the surveyed dental care professionals incorrectly identified fluoride instead of potassium nitrate or strontium chloride as the active agent in desensitizing toothpastes.

- Many were unaware that most desensitizing toothpastes, when used regularly, are effective in preventing caries, just like non-desensitizing toothpastes that contain fluoride.

It is not surprising therefore, that 50% of respondents reported they were only somewhat or very confident about managing their patients' pain.

Clinical and academic experience: a framework for management.

The limited professional knowledge base emphasized the pressing need for clear instruction in managing and treating dentin hypersensitivity. Where science was lacking, board members incorporated learnings from their own diverse clinical and academic experience, developing a framework of fundamental steps to direct clinicians. To provide a systematic approach to the problem, a treatment algorithm was developed, reflecting many of the board's final recommendations. This included diligent screening, correct diagnosis, management and treatment, along with regular follow-up.



See Consensus-Based Recommendations for detailed algorithm on diagnosis and management

Education: a prerequisite for best practice.

While most patients hesitate to report their sensitivity, methodical screening and diagnosis by dental professionals are also lacking. As a result, dentin hypersensitivity is highly prevalent, but underreported and underdiagnosed.* Professionals are often unaware that affected patients may be deterred from keeping regular dental and

hygiene appointments, due to the discomfort elicited by various standard procedures.² This highlights the importance of ongoing screening and the need for improved management skills.

Dental professionals must initiate conversation about sensitive teeth, provide patient education and long-term counselling to address the high prevalence of this painful condition. Increasing emphasis on dentin hypersensitivity in the curriculum of dental and hygiene schools, as well as the availability of continuing dental education programs, will elevate professional knowledge and confidence. This will provide dentists and hygienists with the tools to assume greater responsibility in addressing this condition, so that patients are not left to suffer in silence.

The Canadian Advisory Board on Dentin Hypersensitivity was supported by an unrestricted educational grant from GlaxoSmithKline Consumer Healthcare.



*Reported prevalence range 8-57%.

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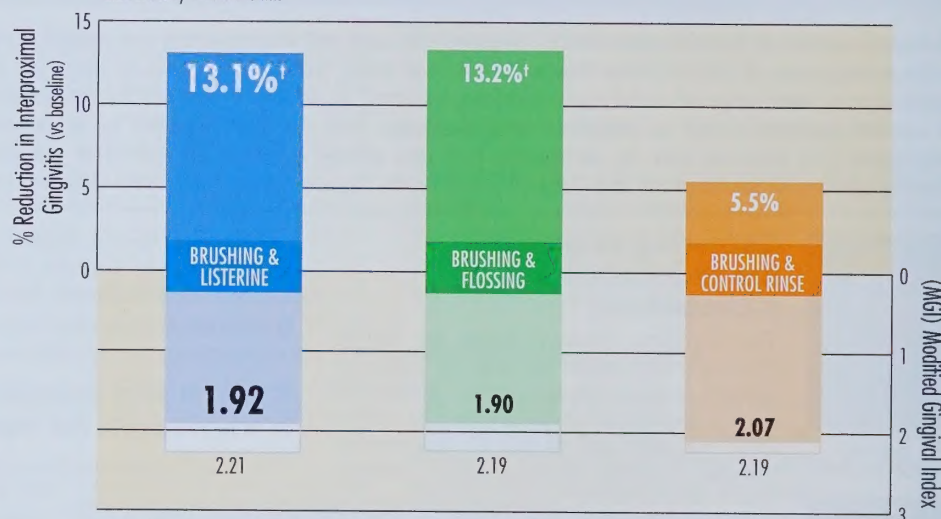
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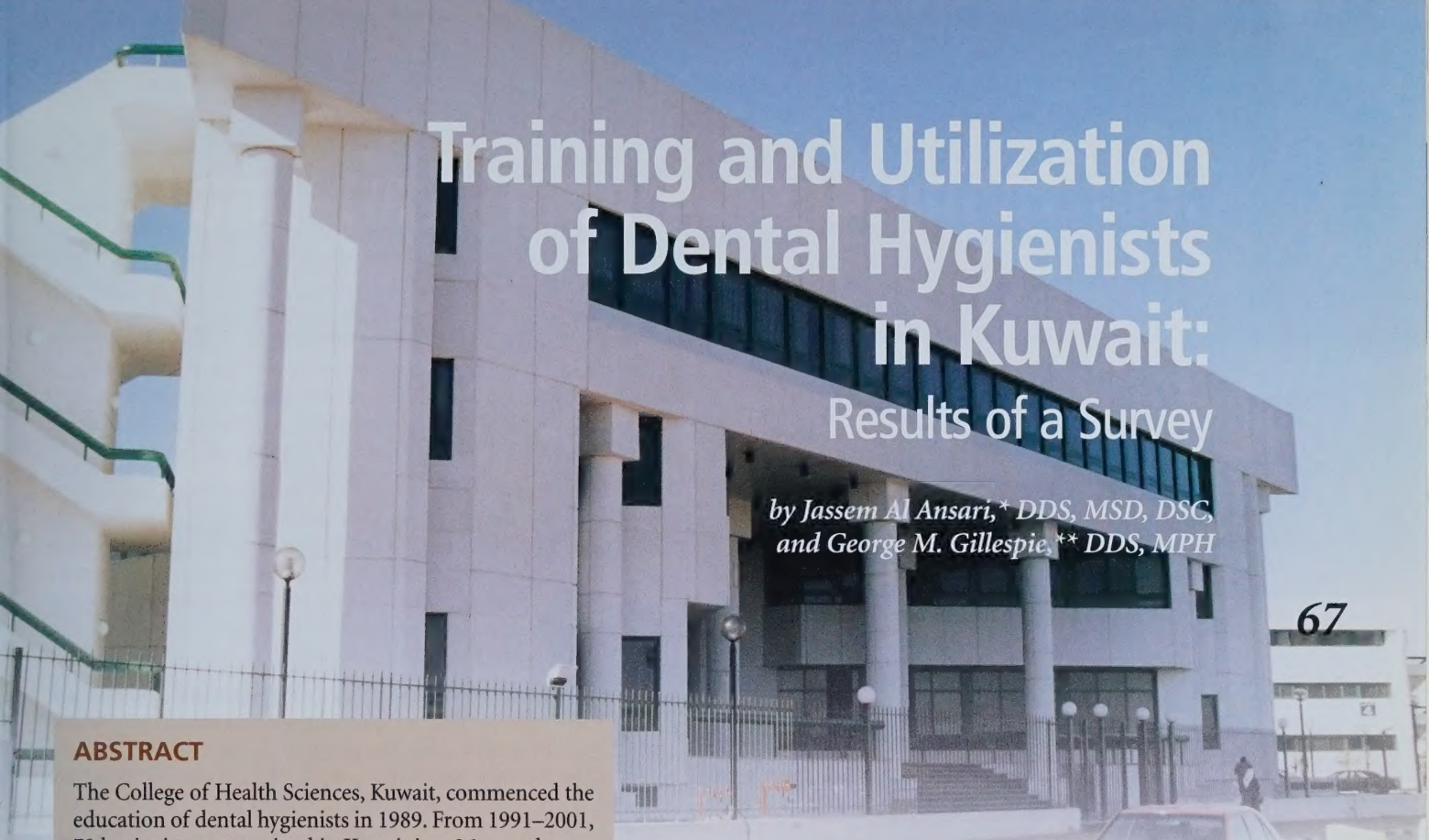
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Training and Utilization of Dental Hygienists in Kuwait: Results of a Survey

by Jassem Al Ansari,* DDS, MSD, DSC,
and George M. Gillespie,** DDS, MPH

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ABSTRACT

The College of Health Sciences, Kuwait, commenced the education of dental hygienists in 1989. From 1991–2001, 79 hygienists were trained in Kuwait in a 26-month program. The purpose of this study was to assess the extent to which practising dental hygienists were utilizing the knowledge gained in training and to identify expressed future needs. A survey questionnaire was distributed to 66 employed dental hygienists in the private and public health sectors in Kuwait. A response rate of 100% was achieved. Of the respondents, 80% were Kuwaiti with national diplomas; 98% of all graduates were trained in and are practising health education, application of fluorides, extra and intra oral examinations, scaling; 98% of respondents had been trained to apply sealants, but only 77% were currently applying that knowledge. X-rays, root planing, oral hygiene indices, and use of antimicrobials were the skills that were most often taught but not applied. Thirty-eight per cent of respondents reported working with assistants. Ninety-two per cent indicated that they were given respect by clients, and 75% by dentists. The most expressed needs were for continuing education, dental assistants, and access to post-diploma education. Changing technology highlights the need for continuing education programs for dental hygienists and for access to post-diploma education. Public programs and private practices should be advised of the skills acquired and honed in continuing education, and subsequent practice should utilize fully the skills of the trained dental hygienists. Greater promotion of the role and value of the dental hygienist should be made by the dental profession.

Keywords: Oral health, dental hygiene, training, utilization, Kuwait

INTRODUCTION

The concept of preventive dentistry for the public was advanced in 1845 and subsequently the need for a subspecialty in dentistry to address oral disease prevention.^{1,2} Albert Fones conceptualized a preventive oral health worker as early as 1913 and established the first school for the training of dental hygienists in Connecticut, United States.³ Dental hygiene is the study of preventive oral health care and the management of behaviours that are needed to prevent oral disease and to promote health. The central concepts in dental hygiene include the client, the environment, health, oral health, dental hygiene actions, their relationships, and the factors that affect them.⁴ The dental hygienist has been defined as a licensed professional member of the health care team who integrates the roles of educator, consumer advocate, practitioner, manager, change agent, and researcher to support total health through the promotion of oral health and wellness.⁴

Dental hygienists were first educated and introduced as a preventive agent, health educator, and effective community health worker in the United States.^{5,6}

Dental hygienists were subsequently educated and utilized in other countries. The curriculum was similar to that of the United States, but the economic, social, and health service environments were different.

The State of Kuwait, occupying a territory of 17,818 square kilometres, is in the Middle East, with borders on Saudi Arabia to the south and southwest, Iraq on the north and northeast and the Arabian gulf to the east. In 1995 the population was 1,575,570 of which 41.5% were Kuwaitis distributed in five major regions. By 2002, the population had grown to 2,275,000 of which 884,550 (38.9%) were identi-

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** Professor and Consultant, College of Health Sciences, Public Authority for Applied Education and Training, Kuwait

Compulsory general courses (11 credits)

Islamic culture	Computer
Human relations	English language
Introduction to psychology	

Compulsory specialized courses (41 credits)

Dental terminology	Oral pathology
Practical oral and dental hygiene	Clinical oral hygiene I, II, III
Introduction to dentistry	Management of dental clinics
Oral and dental histology	Emergencies in dental clinics
Periodontics I and II	Children's oral health
Oral and dental public health I and II	Research methodology in dentistry
Dental radiology	Infection control in dentistry
Dental materials	Summer field training

Compulsory supporting courses (14 credits)

Nutrition and oral dental health	Pharmacology
Anatomy	Health chemistry
General microbiology	

Optional general courses (each = 2 credits)

Arabic typing	First aid
English typing	Kuwait and development

Table 1. Kuwait dental hygiene curriculum (students require 68 credits to graduate)

fied as Kuwaiti citizens.^{7,8} The life expectancy at birth for Kuwaitis has increased from 75.2 to 76.3 years in the period 1997–2001.⁹

The population of Kuwait in 2000 was 2,243,800. With 717 dentists in the Ministry of Health service (225 of whom were Kuwaiti citizens),¹⁰ and 145 dentists in private practice, the total number of dentists in the country was 862.

This gave an overall dentist-to-population ratio of 1:2,602.¹⁰

There is a shortage of dental hygienists in Kuwait with only 74 practising clinical dental hygienists (57 Kuwaiti and 17 non-Kuwaiti). The ratio of dental hygienist to dentist for the Ministry of Health service dentists is 1:9.6. When one considers both government and private practice dentists (862), the ratio is 1:11.6.⁹

In 1988, the Ministry of Health requested and authorized the education and training of dental hygienists in view of the lack of national dental hygienists and the need to improve the delivery of oral health services to the population. This decision was taken in view of the shortage of dental hygienists, the need to develop local resources, and the lack of availability of suitable foreign graduates. At the time, there were only five dental hygienists, none of whom were Kuwaiti. The College of Health Sciences, Public Authority for Applied Education and Training (PAAET), Kuwait, had been established in 1982. It started the program for Kuwaiti dental hygienists in 1989.¹¹ There were initially 12 dental hygiene students; the program currently graduates approximately 8 students per year.

Only one dental hygiene diploma program is offered in Kuwait via the College of Health Sciences (PAAET) in Kuwait City. The program, patterned after that utilized in the United States and with the advice and input of local Kuwaiti practitioners and well-known international consultants,^{12,13} is available to Kuwaiti nationals and to a limited number of scholarship students who are not Kuwaiti citizens (5%) from Gulf Cooperation Council (GCC) countries.

Entry requirements are graduation from high school with a 2.5 GPA out of a possible GPA of 4, the successful completion of science subjects, and declaration that the candidate is medically healthy and fit to undertake the program.

The curriculum (see Table 1) is based on a credit system and extends over a 26-month period,¹⁴ composed of two semesters of 14 weeks per year and a summer session of community experience. The average requirement is 17 credit hours per semester. In order to graduate, a student must have passed all required subjects and have a GPA of over 1.5 out of a possible 4, the minimum requirement for all subjects taught in the College for Health Sciences (PAAET). Obtaining a higher GPA confers additional categories of distinction.

There is no periodic formal accreditation process currently in place for the dental hygiene program at PAAET. Over the period 1990–2001, 79 dental hygienists have earned diplomas in dental hygiene, 3 dental hygienists have baccalaureate degrees from U.S. universities, and 3 have earned masters degrees from U.S. universities. No Kuwaiti dental hygienist currently holds a doctoral degree.

The education of Kuwaiti dental hygienists is government sponsored and they are guaranteed employment in the government sector following graduation. To practise, a dental hygienist must graduate from a dental hygiene diploma program approved by the Ministry of Health.

Dental hygienists are regulated and licensed to practise by the Ministry of Health's Office of Dental Administration. This body is staffed by dentists and is responsible for the regulation and practice of oral health professions. Decisions regarding the dental hygiene profession are made without input from dental hygiene. In addition to these powers, the Office also can determine the program for dental hygiene education at the College of Health Sciences or terminate the program if it is considered unnecessary by society.

Licensure candidates from the United States are required to pass a national dental hygiene examination to evaluate their knowledge and scientific basis for practice prior to receiving a licence. Foreign-trained dental hygienists are also required to sit a Kuwait exam and meet the criteria of the Ministry of Health prior to employment.

Upon graduation, dental hygienists, under a dentist's general supervision, can work within clinics of the Ministry of Health (primarily in the public clinics, specifically in government medical centres providing primary health care and general dental clinical practice); the Kuwait Oil Company; and the armed services or the military hospital. There are currently no Kuwaiti dental hygienists working in private practice. However, there are foreign graduates, some of who are dentists, who are working as dental hygienists in private dental clinics. Foreign-educated dental hygienists are permitted to practise in Kuwait provided they meet the standards and conditions of the Ministry of Health.¹⁵

They, like Kuwaiti-trained dental hygienists, are not permitted to work in private practice.

Dental hygienists carry out the dentist's instructions and treatment plans under general supervision, depending on the program in which they are working. An example of a job description for dental hygienists in Kuwait is shown in Figure 1.¹⁶

Long-term pain management tool?



NEW Canadian Consensus Report on dentin hypersensitivity recommends

a long-term approach to management, with desensitizing toothpaste as first-line treatment.[†]

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[†] Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity. Canadian Advisory Board on Dentin Hypersensitivity. *J Can Dent Assoc* 2003;69(4):221-226.

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* The insurance program is underwritten and issued by Sun Life Assurance Company of Canada, a member of the Sun Life Financial group of companies.

The nature of the profession is changing internationally with marked changes recently occurring in the scope of function and regulation of dental hygienist practice in Canada and the United States.^{17,18,19} These considerations, along with the 10 years of dental hygiene education in Kuwait, prompted a review of current training and employment of dental hygienists in Kuwait in order to evaluate the existing situation and to assess future needs.

The purpose of this study was twofold: (1) to assess the extent to which practising dental hygienists in Kuwait were utilizing the knowledge gained in training, and (2) to identify expressed future needs.

MATERIALS AND METHODS

A questionnaire identifying the major areas of dental hygiene training in the regular curriculum, with emphasis on 15 clinical functions,* was developed, pre-tested, and distributed to 66 dental hygienists currently practising in the private and public health sectors. Informed consent was obtained from the Ministry of Health and the participants, and a follow-up visit was made to all respondents. Replies were analyzed for dental hygiene procedures performed by years since graduation, current practice setting, and nationality (Kuwaiti and non-Kuwaiti). Statistical analysis was performed applying chi-square and non-parametric asymmetric two-tailed tests.

RESULTS

A 100% response rate was received for the questionnaire from the 66 dental hygienists. Eighty per cent of the respondents were Kuwaiti with national diplomas. The Kuwaiti dental hygienists, educated in a government-financed program, worked in the public sector while the non-Kuwaitis worked mainly in private practices. The majority of the dental hygienists (69.24%) received a 26-month training course. Ninety-eight per cent of all graduates were trained in and are practising health education, application of fluorides, extra- and intra-oral examinations, and tooth debridement.

There were no significant differences in the education and clinical functions performed between dental hygienists who had graduated fewer than five years ago (44.6%) and those who had graduated more than five years ago (55.38%). However, a two-tailed non-parametric test did identify a significant difference between these two groups ($p = 0.05$) when dental hygienists with more than five years' experience indicated that they were asked to perform functions for which they had not been trained.

With regard to specific functions, the following figures emerged:

- 98% had been trained to apply sealants but 23% were not applying them in practice
- 97% of respondents stated they were trained to take and expose radiographs, but 62% were not using this skill in practice

* The 15 clinical functions are fluoride application, extra- and intra-oral examination, occlusion, CPITN, use of the explorer, scaling, root planing, radiographs, motor polishing, air polishing, oral hygiene index, oral hygiene education, deplaqueing, anti-microbials, and sealants.

JOB DESCRIPTION:

Dental hygienist, Kuwait

The graduate of the Oral and Dental Health Department, College of Health Sciences, Kuwait will work at the Ministry of Public Health as a dental hygienist under the supervision of a dentist. He/she will provide preventive dentistry to patients with minor therapeutic procedures in the field of periodontology.

Duties: The graduate should be able to do the following:

1. Sampling diagnostic information from patients:

- a. Examine the condition of the oral cavity
- b. Medical and dental history registration
- c. Preliminary dental caries registration
- d. Preliminary periodontal registration
- e. Preliminary registration of defective restorations
- f. Expose and process oral radiographs
- g. Take impressions for study models

2. Dental health education and prophylactic measures against dental caries and periodontal diseases, on an individual or group basis:

- a. Preventive dental health information and motivation
- b. Dietary recommendations and advice
- c. Instruction in oral hygiene, to include prescription of toothbrush, toothpastes, and oral hygiene aids
- d. Local treatment with fluorides and other dental caries prophylactic and plaque-inhibiting substances
- e. Sealing of fissures in accordance with instructions by the dentist in charge

3. Oral hygiene measures:

- a. Removal of hard and soft tooth deposits and overhangs, such as through supra- and sub-gingival tooth debridement, root planing
- b. Polishing of tooth surfaces and restorations to facilitate the patient's home care
- c. Post-surgical treatment following periodontal surgery such as the application and removal of Perio-pack
- d. Tooth desensitization

In addition, the dental hygienist should have knowledge of the following:

- Emergency care of patients
- Managing the dental clinic
- Infection control procedures
- Planning, conducting, and evaluating community dental health education programs
- Conducting screenings and compiling statistics for epidemiological purposes

Figure 1. Job description for a dental hygienist, Kuwait, 2002. From the Ministry of Public Health, Kuwait

- 94% were trained to apply antimicrobial agents but 38% were not applying them
- 71% would like to seek further education
- 35% also perform assistant duties
- 60% did not use high-speed evacuation
- 62% did not work with an assistant
- 80% perform oral hygiene for orthodontic patients
- 83% had been trained in CPR
- 1.55 % worked standing up

Applying a chi-square Fisher's Exact two-tailed test to both Kuwaitis and non-Kuwaitis, significant differences ($p \leq 0.05$) were found between training and application of skills in the following areas: root planing ($p = 0.027$), root debridement ($p = 0.018$), and use of antimicrobials ($p = 0.015$). With just Kuwaitis, the significant differences were root debridement ($p = 0.025$) and use of antimicrobials ($p = 0.041$). Fifty-two per cent stated they were able to use computers but the level of skill and applications were not assessed. Ninety-two per cent indicated that they were given respect from the clients and 75% indicated respect from dentists.

The most expressed needs by the respondents were for continuing education (52%), dental assistants (27%), and the establishment of a bachelor's degree program (10%). The performance of additional clinical functions, such as administration of local anesthesia, simple restorations, and fissure sealants for adults was also mentioned by 27%. There was general consensus on the need for more extensive use of audiovisual materials and ready access to the Internet for students in order to obtain current information and to participate in distance learning. The need to establish an association for dental hygienists, with representation at oral health policy levels and with international access (to attend international dental meetings and conferences as well as represent Kuwaiti dental hygienists on international dental hygiene bodies) was also expressed.

DISCUSSION

Dental hygienists in several other countries currently perform not only in the role originally envisaged for them—preventive oral health workers and educators employed in dental practices—but also in practice settings such as long-term care facilities, facilities for persons with disabilities, community health centres. In some areas they provide other services such as suture removal, local anesthesia administration, and limited restorations.²⁰ The dental hygienist has been considered a co-therapist with the dentist and an integral part of the oral health team.²¹ The American Association of Dental Schools (*now* the American Dental Education Association) and established national dental hygienist associations have reviewed and provided recommendations for development of the profession.²² The Canadian Dental Hygienists Association's (CDHA) recommendations to the commission reviewing of health services in Canada in 1988 covered regulation and supervision, practice standards, quality assurance, improvements in education, and a larger role for dental hygienists.¹⁷ Some of the recommendations of the Canadian Dental Hygienists Association to the Standing Committee on Health were included in the committee's recommendations to the House of Commons in June 2003. These recommendations would further expand the capabilities of the dental hygienist in dental practice.¹⁹

Dental hygienists also now play a more active role in the maintenance and supervision of patients undergoing orthodontic treatment or tooth realignment in what can be referred to as a collaborative practice.²³ In most countries, dental hygienists work under the supervision of a dentist, although since the 1980s, certain states in the United States and provinces in Canada have permitted unsupervised practice.²⁴ Increased public awareness of oral health, and the need to satisfy the demand for oral health care, required new and alternative approaches to the provision of services.²⁵ Needleman indicated an expanding role for dental hygienists in view of the greater recognition of the need for oral hygiene and the relationships between oral health and systemic diseases.²⁶ Changes occurred in the patterns of dental practice with the introduction of new concepts, new techniques, and new approaches to health care and maintenance of the oral cavity. The education and participation of the dental hygienist have changed in accordance with the needs of the oral health team.

The dental hygienist/dentist ratio is 1:11 in Kuwait. Assuming that Kuwaiti citizens make up 45% of the population, the dental hygienist to Kuwaiti population ratio is 1:12,129. For the total population, the ratio is 1:30,322. Therefore, in order to make services responsive to the public need and to achieve dentist/dental hygienist and dental hygienist/population ratios that are comparable to those in the United States (estimated dental hygienist/dentist ratio of 1:1.3 in the year 2000),^{27,28} it is obviously necessary to increase the number of dental hygienists. In addition, the ability of dental hygienists to provide services could be enhanced by adding dental assistants to the work team.

Based on results of this survey of 15 clinical activities, it is evident that most dental hygienists in Kuwait are performing the functions for which they were educated, and virtually all are participating in health education, extra- and intra-oral examinations, prophylaxis, and application of fluorides for prevention. Although all were trained to apply sealants, these are included mainly in clinic programs for primary school children. Consequently, the dental hygienists who are not involved in those programs are not utilizing this skill. In the case of radiographs, the dental hygienists are trained to take and expose these. However, local regulations specify who can undertake this function in the government clinics where X-ray technicians may perform this function.

In this regard, Kuwaiti dental hygienists play a reduced role in oral health care delivery when they are compared with their counterparts in North America and Canada. The most notable elements are that their sole source of employment is with the government and that they work in dental centres with pre-selected patients. They do not work in independent or private offices; conduct intra-oral assessments or evaluation and recall examination; or have maintenance and follow-up responsibilities. Clinical functions are limited to tooth debridement in general dental centres, and placement of sealants in pedodontic centres. They do not take radiographs, participate in practice management, and have no specific dental hygienist association.

The finding that dental hygienists who had graduated more than five years previously were asked to perform tasks for which they were not trained indicates the changes occurring in the provision of oral health services and the need for planned continuing education. Further studies are required to identify those additional tasks for which the dental hygienists were not trained and to form proposals for government development of future oral health services.

Gibbons, for example, in a study of dental hygienists in the United Kingdom, identified the commitment of dental hygienists to continuing education and personal development.²⁹ Seventy-five per cent had attended a training course in the year prior to the survey; 70% had attended scientific meetings.

Additional subject areas should be considered for inclusion in the current dental hygiene curriculum: reinforcement of computer literacy, information technology, clinic management, provision of local anesthesia, chemotherapy, pre-surgical patient preparation, post-surgical management and evaluation, as well as specific clinical needs required by the local programs and dental practice. Training should also contemplate and make provision for home visits to deliver

CDHA

15th Annual Professional Conference



Conference Program Schedule and Registration Form

On behalf of the Newfoundland and Labrador Dental Hygienists Association, we invite you to St. John's, Newfoundland for the CDHA 15th Annual Professional Conference. For two days, hundreds of dental hygienists will meet in Canada's oldest city to further their knowledge, network with other dental hygienists, and celebrate their profession. Join us from June 25th to June 27th in St. John's where a sea of opportunity awaits you!



Fun on the Rock — Make it a Family Affair!

If you haven't yet planned your summer vacation, why not bring the entire family! While you attend the conference, they can take advantage of all that St. John's has to offer with our Children and Spousal Programs.

OFFICIAL SPONSORS

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Program at a Glance



Thursday, June 24, 2004

4 p.m. to 7 p.m. Conference registration opens

Friday, June 25, 2004

7 a.m. to 8 a.m. Conference registration
 8 a.m. to 9 a.m. Opening breakfast
 9 a.m. to 10:30 a.m. Concurrent scientific sessions
 10:30 a.m. to 11 a.m. Nutritional break
 11 a.m. to 12:30 p.m. Concurrent scientific sessions
 12:30 p.m. to 2 p.m. Lunch and table displays; poster presentations
 2 p.m. to 3:30 p.m. Concurrent scientific sessions
 3:30 p.m. to 4 p.m. Nutritional break
 4 p.m. to 5:30 p.m. Concurrent scientific sessions
 Friday evening Free time

Saturday, June 26, 2004

7 a.m. to 8:30 a.m. Conference registration
 7 a.m. to 8:30 a.m. Continental breakfast
 8:30 a.m. to 10 a.m. Concurrent scientific sessions
 10 a.m. to 10:30 a.m. Nutritional break
 10:30 a.m. to 12 noon Concurrent scientific sessions
 12 noon to 3 p.m. Lunch and exhibit hall
 3 p.m. to 3:30 p.m. Nutritional break
 3:30 p.m. to 5 p.m. Concurrent scientific sessions
 Saturday Evening Gala Silent auction, dinner, and entertainment

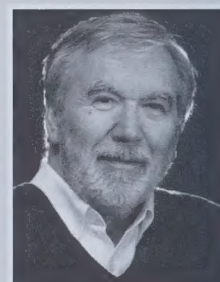
Sunday, June 27, 2004

9 a.m. to 11 a.m. Breakfast key note address; closing ceremonies

Keynote Presentation – Sunday, June 27, 2004

Ed Smith, a native of Newfoundland, resides in Springdale with his wife. A graduate of Mount Allison University and Memorial University, Mr. Smith began teaching in 1966 and held various positions over the course of his career, including vice-principal and principal, assistant superintendent, as well as principal of a local community college campus. At the encouragement of his wife, Mr. Smith also started writing a weekly humour column, which he did for 20 years. His articles and columns have appeared in such publications as the *Toronto Star*, *Reader's Digest*, and *Newfoundland Sportsman*. Mr. Smith has received many honours and awards, such as the award for excellence in broadcasting by the Canadian Nurses Association as well as an international Gabriel award for material "which inspired and uplifts the human spirit." Two and a half years following retirement, a severe car accident left Mr. Smith with a broken neck and quadriplegic; four years later, he is still unable to walk. His seventh book, *From the Ashes of My Dreams*, follows his experiences during 18 months of hospitalization and rehabilitation in various centres in Newfoundland and Ontario.

With his renowned sense of humour, Mr. Smith will provide us with an uplifting and inspiring keynote address, "You Might As Well Laugh," showing delegates the power of humour in overcoming life's challenges.



Saturday Evening Gala Event

Experience A True Taste of Newfoundland!

Come and celebrate the profession of dental hygiene! The Saturday Evening Gala will consist of a dinner buffet and live entertainment by local fiddlers and singers. A silent and live auction will also take place to raise funds for dental hygiene education and research.

Note: The Saturday Evening Gala is included with Full Registration. The cost of the Gala is not included in the Daily Registration fees. Tickets for the Gala event may be purchased separately.

Scientific Program

The following presentations will be given concurrently over the course of the two days of the conference.

Research and Technology

Dental Hygienists Accept the Challenge of Practice in Long-Term Care in British Columbia

Shirley Bassett Dip DH, BScD (DH), and Dianne Gallagher Dip DH, BGS, M Ed

This presentation profiles the work of dental hygienists in British Columbia who have taken on the challenge of practising in long-term care. Historical perspectives, enabling legislation, early developmental work, continuing education, and business perspectives are highlighted along with an introduction to several different approaches to providing care for residents of care facilities. The presentation illuminates why dental hygienists should be integral members of the health care team in long-term care.

Dental Hygiene Electronic Evaluation System (DHEVA)

Eunice Edgington, DipDH, BScD, MAEd

The acquisition of dental hygiene clinical skills is an intricate teaching-learning process that requires intense attention to detail, continual hands-on instruction, observation, and evaluation. A project was initiated that involved the development of a competency-based electronic evaluation system on a hand-held computer (Palm) for Dental Hygiene Clinical Education. This enabled instructors to evaluate student performance in all clinical procedures at chair side. This presentation will provide an overview of this project, its results, and projected outcomes.

Dentin Hypersensitivity: New Best-Practice Guidelines for a Widespread Condition – A Hygiene Perspective

Marilyn Goulding, RDH, BSc, MOS

The high prevalence of dentin hypersensitivity, combined with continued underreporting and underdiagnosis, has intensified the need to focus on the management of this condition. Responding to that need, the Canadian Advisory Board on Dentin Hypersensitivity, a committee representing a broad range of dental care specialties, convened to determine best-practice recommendations. The presentation will review the definition, etiology, mechanisms, and management of the condition and provide an educational review of the Board's recommendations.

Sponsored by GLAXOSMITHKLINE

Self-Assessment for the Professional Development of Health Care Providers: An Application of Educational Theory and Principles

Joanna Asadoorian, AAS, BScD, MSc

Emerging reports indicate continuing education as the only vehicle for maintaining competence in health care professionals is insufficient. Research supports more sophisticated strategies in post-registration learning based on sound educational theory and principles. Self-assessment is repeatedly recommended and described in the literature as being critical within the adult learning paradigm and has been incorporated into various quality assurance programs. However, resources available to assist individual professionals in carrying out rigorous self-assessments as part of post-registration learning is scanty, fragmented, and therefore difficult to access and utilize. The aim of this presentation is to describe the role of self-assessment in post-registration professional learning and provide a workable model for health care professionals with the purpose of facilitating the process of conducting meaningful self-assessments.

Biofilm—and You Thought It Was Just Plaque!

Marilyn Goulding, RDH, BSc, MOS

Research on biofilms has developed over the past decade and is now melding into our understanding of the oral environment. Biofilm is not merely a threat in dental unit waterlines; we have come to a whole new realization of its essence and complexity in dental plaque. Biofilm is not just a build-up of individual microbes that is easily removed; we now know it as a complex community that builds in a specific and intricate manner. Biofilm is capable of both attacking the host and defending itself from immune mechanisms with actual "communication," making it an organism unto itself. This presentation will assist clinicians in realizing the importance of *in vitro* biofilms as a validated method for explaining intraoral phenomena. As well, the effects of fluid forces in building and removing biofilms and how new sonic technology can assist in the battle against biofilm will be examined.

Integrating Surgical Magnification into Dental Hygiene Practice

Susanne Sunell, RDH, EdD

Dental hygiene studies suggest that the integration of surgical telescopes would be helpful in reducing the incidence of musculoskeletal symptoms experienced by dental hygienists. However, dental hygienists need to understand the characteristics of magnification systems to make an informed choice regarding their integration into practice. This presentation will provide a review of the variety of systems that can meet dental hygienists' needs and considerations for selection of a surgical telescope.

Research Utilization Behaviours of Practising Dental Hygienists in Alberta

Sandra J. Cobban, RDH, MDE

Skills for evidence-based decision making include defining a patient problem, conducting a search of the literature, and identifying, retrieving, and evaluating relevant studies. Beyond studies of information-seeking behaviours, studies of research utilization (UR) by dental hygienists have not been conducted. The purpose of a recent study of practising dental hygienists in Alberta is to describe RU behaviours, whether instrumental, conceptual, or symbolic. This presentation will provide an overview of the study results to date.

Discursive Constructions of Social Responsibility

Shafik Dharamsi, RDH

There is a widespread concern that the dental health care system in North America sustains an inequitable opportunity for accessing care. In response, the term *social responsibility* appeared in the dental literature. However, it is not clear how this is understood and enacted, particularly within the context of a growing desire to enhance access to oral health care through an affordable, equitable, and practical system of delivery. This presentation will review the findings of a study on social responsibility of 34 participants, comprising dental educators, dentists in private practice, and those in leadership and governance of dentistry.

Evidence Based Decision Making, Managing Information, Improving Client Care

Salme Lavigne, RDH, BA, MS(DH)

The concept of *Evidence Based Decision Making* is one that is given a lot of lip service, however, often poorly understood. With the

overload of information from a variety of sources, it is difficult to decipher what information is valid and appropriate for making clinical decisions involving client care. The aim of this presentation is to provide an understanding of evidence based decision making, what it encompasses and how to find and rank the evidence for any given clinical question.

Sponsored by ORAL-B

Case Studies/Projects

Collaboration with Corporate Nursing Practice Council to Revise the Corporate Mouth Care Policy

Anne Clift, RDH

The Corporate Nursing Mouth Care Policy was scheduled for review and revision in 2003. A dental hygienist and a member of nursing practice council worked together to review the existing policy and revise the existing policy to reflect current evidence-based practice and to enhance the professional knowledge of nursing staff regarding mouth care for the conscious and unconscious patient in a three-month period. This presentation will provide an overview of this collaboration.

Thinking and Working Outside the Box – Operatory

Jane Waites, RDH

As preventive oral health specialists, dental hygienists are trained and ready to improve the oral health and in turn the overall health of Canadians. As a result, there is a great opportunity to position the profession with the health care team. To accomplish this, dental hygienists need to identify opportunities to bring expertise and care beyond the traditional operatory setting to people in the community. This presentation will examine how the groundbreaking ALS dental hygiene outreach program in the Toronto area opened the eyes of the dental profession to the needs in the community and the many opportunities for dental hygienists.

Changing to Self-Employment

Kim Christianson-Gagnon, RDH, BSc

This case study focused on the organizational changes associated with the incorporation of a dental office in Ontario. The objective of this case study was to determine what happened, what went right and what could or should have been done differently to improve the delivery of salary. This presentation will show how these dental hygienists had to overcome changes and barriers during the implementation of self-employment.

Infant Health and Dental Hygiene Professional Recognition... Proving that One Thing Does Lead to Another

Mickey Emmons Wener, BS (Dent Hyg), MEd, CTESL

Parents, professionals, and decision-makers all have little knowledge about infant oral health. Early childhood caries (ECC) is a very significant health problem in many populations. There is little recognition and much public confusion about dental hygiene, its role, and its importance to overall health. Combined, these facts created a vacuum that became evident while lobbying for legislative change in Manitoba and served as the springboard for increasing the public's awareness of maternal and infant oral health. This presentation will provide an overview of the events and strategies that unfolded during legislative activity and up-to-date research on early childhood caries and infant oral health for both private-practice and community-based dental hygienists.

Effective Management of Tooth Pain: Going Beyond Durafurl

Danne Mykiety, RDH, BS

People of all ages experience a significant increase in tooth sensi-

tivity that results in a variety of oral health care concerns and problems. Based on a 15-year review of the literature on dentin sensitivity and clinical practice in general and periodontal practices, the objective of this study was to determine the specific lifestyle and self-care habits that predisposed clients to exposed dentin and enamel erosion or abrasion. This presentation will review the findings of this study.

Oral Breathing and Dental Hygiene Procedures

France Lavoie, HD, BA, MA

The client's breathing can be neglected during a dental hygiene procedure, such as topical fluoride application. Determining the client's ability to breathe through the nose during a procedure is an important objective. A clinical study using the Bronfenbrenner Model and the Balance Model determined techniques to assist in the placement of tools during topical fluoride application when nasal breathing was either impossible or uncomfortable for the client. This presentation will review the findings of the study.

Myo-functional Therapy in Dental Hygiene

France Lavoie, HD, BA, MA

Dental hygienists act as facilitators for behavioural change. Although some behaviour can be easily modified, others require stronger intervention. The use of Myo-functional Therapy (MFT) can be useful in the modification of behaviours requiring stronger intervention. By reviewing a case study of the first Quebec dental hygienist to open her own office and offer this service, the presentation will review the ways Myo-functional Therapy can be incorporated into the practice and billing of dental hygiene.

Workshops

Dental Hygiene: The Financial Side of Self-Employment

Micheline Maes, Filomena May

This presentation will outline the financial side of running one's own business as it pertains to corporations and sole proprietorships and their distinct structures and tax implications. The presentation will explore regulations and taxable income, and available programs such as Profit Sharing Trusts. The presentation will also review considerations for the need for disability insurance held inside or outside of a corporation.

Work your Ultrasonic Power Scalers Smarter!

Sylvie Martel, RDH

Upon completion of this hands-on workshop, the participants will be able to better assess the client's periodontal condition with an emphasis on subgingival root anatomy and its clinical implications when providing periodontal debridement; make sound ergonomic choices in terms of ultrasonic equipment and insert design according to the client's condition and the clinician's preference; demonstrate correct use and sequencing of various magnetostrictive inserts in a clinical simulation environment using typodonts.

Achieving Excellence Through Teamwork – Together Everyone Achieves More

Bill Nippard, RDH

This presentation will provide an overview of the seven basic concepts of teamwork as well as a framework for each dental hygienist to determine the specific changes needed to bring true success to their dental team. Through a Power Point presentation, the use of overhead transparencies, and a take-away reflection guide for self-analysis, each participant will be brought into the successful world of teamwork.

Spousal Program

McCarthy's Party Puts the Fun in New"fun"land

Golfing on a hilltop course, sea kayaking through a wildlife sanctuary, boating to Puffin Island to see puffins, and scouting for whales and icebergs are just some of the activities that might pique your spouse's interests. McCarthy's Party, who have been running tours across the island and Avalon Peninsula for over 20 years, will organize the registration and activities for the spousal program. Their well-versed guides are all native Newfoundlanders who are sure to help provide a true taste of the Rock!

Choose one activity for each day

Friday, June 25, 2004

- Golf at Clovelly Golf Course
- Bird's and Berg's Tour
- Sea Kayaking
- Hike of the North Head Trail

Saturday, June 26, 2004

- Golf at The Wild's at Salmonier
- Bird's and Berg's Tour
- Golf at Clovelly Golf Course
- Hike of the North Head Trail

Activities

GOLF AT CLOVELLY GOLF COURSE. The group will travel to Clovelly Golf Course for a day of golf. Located in the northeast part of the city approximately 15 minutes from the hotel, this club offers a scenic championship 18-hole course that is sure to challenge even the most seasoned pro! *The day includes transportation to the course, green fees, power cart, and lunch.*

SEA KAYAKING. On this tour, the group will take a peaceful trip through the world-famous wildlife sanctuaries in sea kayaks! A well-trained guide will provide on-shore basic paddle strokes and safety procedure instruction for the two-person kayak as well as orientation through the sanctuaries. *The day includes transportation, guide, and lunch.*

BIRD'S AND BERG'S TOUR. The day begins with a drive down the Southern Shore to Bay Bulls where the group will join the O'Briens for a boat ride to Bird Islands to see the puffins. On the way, they will scout for whales and icebergs and sing a few ditties! *The day includes transportation to Bay Bulls and guide.*

HIKE OF THE NORTH HEAD TRAIL. The group will take a hike around North Head Trail. This trail will take them through the scenic fishing community of The Battery in St. John's and provide spectacular views from the North Head and Signal Hill, where the trail comes to an end. The hiking continues to Quidi Vidi village, where they will visit the Quidi Vidi brewery and have a refreshing sample of their wares. A quick hike along the popular Quidi Vidi Lake takes the group back to the hotel. *The day includes bottled water and guide.*

GOLF AT THE WILD'S AT SALMONIER. The group will travel to The Wild's at Salmonier for a day of golf. This championship course, designed by Robert Hyslop, is located on the Salmonier River, which winds its way through the course providing a beautiful wilderness experience. *The day includes transportation to course, green fees, power cart, and lunch.*

Children's Program

Children are first at the YMCA-YWCA

The children's program will provide your child the opportunity to explore St. John's and the surrounding area and experience a week-end of fun that will create lasting memories. The Children's Program will cater to children from 5 to 16 years of age in three age-specific categories. The program will be administered by the St. John's YMCA-YWCA, whose staff are certified in Early Childhood Education, First Aid, and CPR.

5 to 7 Year Old Program

FRIDAY, JUNE 25, 2004. Today, the group visits Kid's Castle, a facility with a three-storey climbing play structure, arcade, and craft room. In the afternoon, the fun continues as the group travels to McDonald's to play in the children's playground.

SATURDAY, JUNE 26, 2004. The group starts the morning with a visit to the Newfoundland Science Centre, and then travels to the YMCA-YWCA for craft activities. After lunch, the group will wend its way to Pippy Park for mini-golf and playground fun.

8 to 12 Year Old Program

FRIDAY, JUNE 25, 2004. This morning the group will visit Kid's Castle, a three-storey climbing play structure, arcade, and craft room. After lunch, the group will travel to Wallnuts, an indoor rock climbing facility with several walls with varying difficulty. Instructions will be provided prior to any climbing.

SATURDAY, JUNE 26, 2004. The day starts with a tour of the Fluravium, a natural exhibit of freshwater wildlife, followed by mini-golf at Pippy Park. In the afternoon, a trip to Signal Hill and Cabot Tower, then a tour of the Johnson Geo Centre.

13 to 16 Year Old Program

FRIDAY, JUNE 25, 2004. The day starts with the group walking along the Southern Shore to Ferryland to explore an archaeological dig site. After lunch, the group travels back to St. John's for an afternoon of mini-golf at the MacDonald Drive.

SATURDAY, JUNE 26, 2004. This morning, a short walk takes the group to the Johnson Geo Centre, Signal Hill, and Cabot Tower. In the afternoon, the group will travel to Wallnuts, an indoor rock climbing facility with several walls with varying difficulty. Instructions will be provided prior to any climbing.

Kid's Saturday Evening Party

A special evening of games, music, and movies is planned for your children while you enjoy the Saturday Evening Gala. A special kid's buffet will be served so you don't even have to worry about dinner! The group will be separated into two rooms for age-appropriate activities, each supervised by YMCA-YWCA staff.



Registration Information

Please note:

- Participation is by advance registration only.
- Early Bird registration closes at 12 midnight Eastern Standard Time, Monday, May 31, 2004
- Conference registration closes at 12 midnight Eastern Standard Time, Monday, June 14, 2004

Fee structure

Category	Full Registration		Daily Registration	
	Early Bird	After May 31, 2004	Early Bird	After May 31, 2004
CDHA Member	\$340.00	\$380.00	\$170.00	\$210.00
Non-Member (Dental Hygienist)	\$680.00	\$760.00	\$340.00	\$420.00
Allied Health Professional	\$385.00	\$440.00	\$280.00	\$330.00
Student	\$150.00	\$150.00	\$150.00	\$150.00
	Full registration includes: • Admission to Opening breakfast and scientific sessions on Friday and Saturday • Continental breakfast, nutritional breaks, and lunch on Friday and Saturday • Saturday Evening Gala • Sunday Breakfast Key Note address and Closing Ceremonies		Daily registration includes: • Friday: Admission to the Opening breakfast and scientific sessions, nutritional breaks and lunch • Saturday: Admission to scientific sessions and exhibitor hall, continental breakfast, nutritional breaks, and lunch (Note: The daily registration fee does not include admission to the Saturday Evening Gala; tickets must be purchased separately.)	

Cancellation Policy

If cancellation notice is received, in writing, at the CDHA office prior to 5 p.m. Eastern Standard Time Monday, May 31, 2004, registration fees will be reimbursed in full, less a \$25.00 administration fee. After 5 p.m. Eastern Standard Time, Monday, May 31, 2004, a 50% refund will be issued upon receipt of written cancellation at the CDHA office, less a \$25.00 administration fee. No refunds will be issued after 5 p.m. Eastern Standard Time Monday June 14, 2004. Please note for payments made by personal cheque, refunds will be only be issued once the bank has confirmed clearance of payment; which can take from one to three months. Any payment returned by the bank will also be charged a \$25.00 administration fee.

Hotel Information

The CDHA has reserved a block of rooms at the Fairmont Newfoundland for conference delegates. Hotel accommodations are the responsibility of the participant. To reserve your room, please contact the Fairmont Global Reservation Centre directly toll-free number 1-800-441-1414 and ask for the CDHA Conference Rate. You may also reserve your room on-line by visiting www.fairmont.com; to ensure you receive the CDHA Conference rate, ensure you enter GRDEN1 under the Promotional Code section. **Please note:** Rooms will be available at the conference rate until May 24, 2004. After **May 24, 2004**, delegates will be required to pay regular room rates.

Travel Information

Air Canada has issued a convention number for discounts on air fares. Call Uniglobe Travel at 1-800-267-9372, extension 420, and quote our Convention Number, CV042148. The discounts range from 5% off the reduced Saturday night stay tickets (not valid on advertised seat sales) to 35% off the full-fare tickets (at least 7 days advance purchase needed).

Special Needs?

Do you have special needs/requirements that we should be aware of? If you do, please ensure you complete the Special Needs section of the registration form.

Dental Hygiene Educators of Canada / Educateurs en Hygiène dentaire du Canada

Announcement - Mark your Calendar!

The Dental Hygiene Educators of Canada (DHEC) will be hosting a workshop in conjunction with the CDHA Annual Professional Conference. The workshop is open to members and non-members of DHEC.

Date: Thursday June 24, 2004

Place: The Fairmont Newfoundland, St John's, Newfoundland

For further information, please contact Evie Jesin at 416 415-5000 ext. 4560 or by email at: ejesin@rogers.com

Spousal Program Registration

PLEASE PRINT OR TYPE. Photocopies accepted.

Name: _____

Address: _____

City/Town: _____ Province/State: _____

Country: _____ Postal Code: _____

Telephone: (_____) _____ Fax: (_____) _____

Email: _____



Date	Time	# of Tickets	Price	Total
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Friday, June 25, 2004

Golf at Clovelly Golf Course	(0900 - 1400)	_____	x \$110.00 = \$	_____
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Sea Kayaking	(0900 - 1400)	_____	x \$115.00 = \$	_____
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Bird's and Berg's Tour	(1300 - 1700)	_____	x \$55.00 = \$	_____
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Hike of The North Head Trail	(0900 - 1200)	_____	x \$25.00 = \$	_____
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Saturday, June 26, 2004

Golf at The Wild's at Salmonier	(0800 - 1600)	_____	x \$110.00 = \$	_____
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Golf at Clovelly Golf Course	(1300 - 1800)	_____	x \$110.00 = \$	_____
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Bird's and Berg's Tour	(0900 - 1400)	_____	x \$55.00 = \$	_____
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Hike of The North Head Trail	(0900 - 1200)	_____	x \$25.00 = \$	_____
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Subtotal: \$ _____

HST (15%): \$ _____

Total: \$ _____

METHOD OF PAYMENT

Total amount due in Canadian Dollars (all taxes included) \$ _____

☐ Cheque or Money Order (made payable to McCarthy's Party)

☐ VISA ☐ MasterCard

Name on card: _____

Card #: _____ Expiry Date: _____

Cardholder Signature: _____

Only credit card payments may be faxed. Please do not mail AND fax your registration form.

Please send completed form WITH PAYMENT to:

McCarthy's Party, P.O. Box 13031, Station Topsail,
Conception Bay South, NL A1W 2K1
or Fax to (709) 781-2233

Direct registration enquiries to McCarthy's Party

Tel: (709) 781-2244 Fax: (709) 781-2233
Email: mccarthys.party@nf.sympatico.ca

Crest**Oral-B®**

Registration Form

PLEASE PRINT OR TYPE. One form per registrant. Photocopies accepted.

I am a CDHA Member ☐ Yes ☐ No Membership Number: _____

Name: _____

Address: _____

City/Town: _____ Province: _____

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oral hygiene and for treatment for persons with disabilities. Carrying out these functions under supervision would permit a more cost-effective use of facilities and manpower and provide access and improved oral health to a greater sector of the population.

As mentioned previously, there is no dental hygiene representative within the regulatory structure of the Office of Dental Administration. With the dental hygiene profession having completed a decade of training programs and its members numbering 100 and growing, it seems appropriate to consider forming an association to further dental hygienists' educational, employment, collegial, and international collaborative interests.

CONCLUSIONS

The changing approach to the provision of oral health services and the introduction of modern technology highlights the need for continuing education programs for dental hygienists and access to post-diploma education. Public programs and private practice should be made more aware of the skills acquired by dental hygienists during their education and should fully utilize these skills in subsequent practice. As well, there is a proven increase in efficiency when dental hygienists work with a dental assistant (four-handed dentistry) and consideration should be given to training in this area and the routine use of high-speed evacuation.

The role and value of dental hygienists should be promoted by the dental profession and consideration given to including additional subject areas in the dental hygiene curriculum. This can only improve the abilities and value of the dental hygienist within the oral health team. And in the future, course offerings in more specialized areas could be offered.

The population is living longer and has a heightened awareness of the need for oral health and a greater interest in the quality of life and general health. Human resources in the oral health field have to be utilized efficiently to improve the capacity to maintain the population's oral health. This can and should be achieved through modern approaches to oral health, communication, and the collaborative provision of health services and practice management.

ACKNOWLEDGEMENTS

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TRAINING AND UTILIZATION OF DENTAL HYGIENISTS IN KUWAIT: RESULTS OF A SURVEY ...continued on page 90

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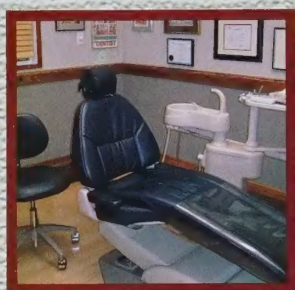
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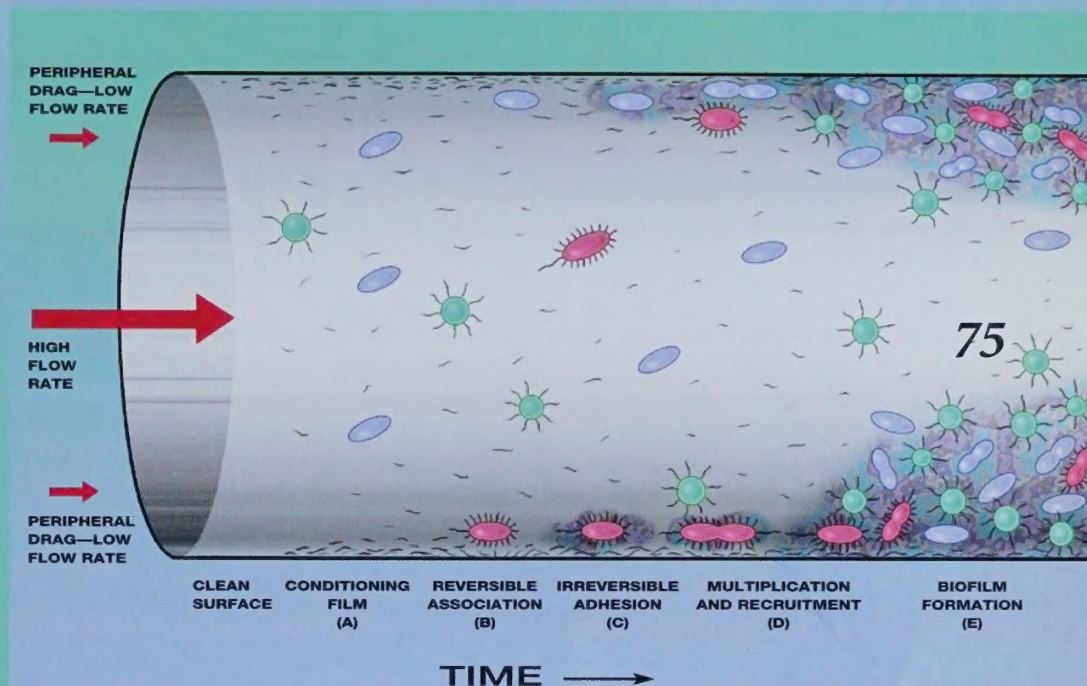
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Dental Unit Waterlines: Potential for Contamination and Recommendations for Maintenance

by Brenda Denluck,* RDH

Figure 1. Biofilm formation in narrow-bore tubing. On adsorption of macromolecules from the aqueous phase and the formation of a conditioning film (A), bacteria may either associate reversibly with the surface (B) or adhere irreversibly (C). Subsequent division of adherent cells (D) and recruitment of planktonic cells from the bulk fluid phase results in biofilm formation (E). (Reproduced from Shearer.)



The public's awareness of microbial contamination has increased over the years, due in part to education and coverage in the popular media. Barbeau explained that the public's fear of microscopic germs has been engendered by companies that have been steadily introducing antimicrobial compounds into various aspects of daily living, including antimicrobial toys, clothing, laundry detergents, and hand soaps.¹ Outbreaks of waterborne infections have also brought about widespread concern regarding the quality of municipal water, and Pankhurst and Johnson commented that the notable increase in sales of bottled water is evidence of the public's concern.²

Along with the public's unease about municipal water quality, there has been an increasing interest and concern about the biofilms that are known to occur in dental unit waterlines, as demonstrated by the numerous studies and reports that have been published in recent years.

The purpose of this paper is to review the literature on microbial contamination of dental unit waterlines, to consider methods of infection control to minimize the exposure, and to identify the obligations of dental hygienists to their clients, as set out in the Standards of Practice and the Code of Ethics published by the College of Dental Hygienists of Ontario and the College of Dental Hygienists of British Columbia.

* Brenda graduated in 2002 from the Dental Hygiene Program at Georgian College, Orillia, Ontario. This paper was submitted on the advice of one of her professors. Brenda is currently working in a dental office in Surrey, British Columbia.

Source: ADA Council on Scientific Affairs. Dental unit waterlines: approaching the year 2000. *J Am Dent Assoc.* 1999;130:1653-63. Copyright ©1996 American Dental Association. All rights reserved. Reprinted with permission.

WATERLINES AND CONTAMINATION

Water is deemed to be potable in Canada when there are fewer than 500 colony-forming units per mL (CFU/mL).¹ Dental unit waterlines have registered counts as high as 200,000 CFU/mL;¹ counts higher than 500 units/mL have been attributed to the development of biofilm in the waterlines. Biofilm is a matrix of microorganisms adhering to the surface of the waterline tubing. Pankhurst and Johnson explain that this adhesion occurs because of the physics of laminar flow. They note that water passes at its maximum flow rate through the centre of the tubing but at its minimal flow rate along the periphery of the tubing. This allows microorganisms to be deposited.² The design of dental units with narrow tubing results in a high ratio of tubing surface to water volume. This, combined with intermittent use patterns, leads to water stagnation and provides the ideal conditions for bacterial proliferation (see Figure 1). Even when new tubing is connected to a water supply, a biofilm will form within eight hours and reach its microbial matrix climax in six days.²

Exposure to contaminated dental water is a concern not only for clients but for dental personnel as well. Exposure can occur by "hematogenous spread during surgical procedures,

local mucosal...contact, ingestion and inhalation.”¹ It should be noted that “exposure does not always lead to transmission”³ and that humans are continuously exposed to microbial flora in “air, soil, water and food.” Another factor to consider is that just because there is a possible danger, it does not necessarily mean that there is an unacceptable risk.³ It is suggested, however, that there is a potential degree of risk for those “immunocompromised or immunosuppressed due to drug therapy, alcohol abuse or systemic disease” because they are susceptible to infections in general.² There is a minimal risk for healthy clients.³ When evaluating research and recommendation reports, consideration needs to be given to the fact that the risk of infection is derived from the virulence and the dose of the microbe and the host’s resistance.

Dental unit waterlines host many organisms, some of which are pathogenic. The two pathogens *Legionella* and *Mycobacterium* spp. that cause wound infections have been found in heavy concentrations, along with numerous other bacteria, fungi, and protozoa.² There are, however, few reported infections that have been linked to dental unit waterlines.¹ Two cases were reported in 1987 in the *British Dental Journal*, stating that “two...medically compromised patients had been infected with *P[sseudomonas] aeruginosa* originating from dental unit water supplies.”¹ Other cases of infection and the development of oral abscesses in “two patients with solid tumours” have also been confirmed from exposure to *Pseudomonas aeruginosa* in the dental office.² Pankhurst and Johnson note that 68% of dental unit waterline samples had detectable *Legionella* spp. and that 8% had *Legionella pneumophila*. They also note that “comparable prevalence rates were observed in potable water samples.” However, the CFU/mL levels were significantly different with 19% of the dental unit waterline samples over 10,000 CFU/mL but none of the potable samples.²

In 1994, a dentist died with the suspected cause being inhalation of pneumonic legionellosis, likely from water sprayed from a handpiece. This, however, this was not demonstrated conclusively. There have also been reports of an eye infection from *Acanthamoeba* spp. resulting from splatter, a brain abscess, and gastrointestinal disorders.¹

Dental personnel are continually exposed to aerosols. There is a potential for disease transmission when solid or liquid airborne particles are expelled from the oral cavity. When these expelled droplets evaporate, “the residual droplet nuclei form and remain airborne in the operator...subject to inhalation.”⁴ Evidence of “altered nasal flora” suggests that waterborne microorganisms are being inhaled from these aerosols.⁵ One study revealed that the “prevalence of antibodies to *L. pneumophila*...among dental personnel” was 34% compared with 5% for a “control population.”¹ However, there have not been any reported cases of *Legionella* pneumonia. A study from 1974 stated that the nasal flora of a number of dentists had an increased prevalence of waterborne *Pseudomonas* that was likely inhaled from contaminated water from high-speed handpieces.⁵ It has been suggested that a “lack of documented disease [*Legionella* pneumonia] among...dental care personnel” may indicate that there is insufficient exposure, adequate host resistance, subclinical infections, or a failure to link diseases to dental unit water.⁵

To further calculate the degree of risk involved, one must consider the problems of measurement. As already mentioned, everyone is exposed to microbial flora in a variety of ways, thus making it difficult to isolate effects actually caused by dental unit waterlines. Also, it must be taken into consideration that the sole measurement of CFU/mL is not a meaningful indicator in scientific calculations because if the temperature of the water changes by only one degree, the number of CFU/mL will change significantly.³

Although there is no evidence of a widespread public health problem and inadequate scientific evidence demonstrating serious health effects related to exposure from dental unit waterlines, the “goal of infection control is to minimise the risk from exposure to potential pathogens.”²

The American Dental Association’s Statement on Dental Unit Waterlines states that the currently available dental unit water systems are incapable of “delivering water of an optimal microbiologic quality.”⁶ The ADA’s Council on Scientific Affairs recommended a target of fewer than 200 CFU/mL. The Council suggests using a combination of methods to achieve this recommendation.⁶

WATERLINE MAINTENANCE

The Canadian Dental Association Board of Governors approved guidelines on dental unit waterline maintenance in 1997, which can be readily implemented by dental personnel.¹ The main recommendation for waterline maintenance is flushing for 5–8 minutes at the beginning of the day. Wilkins has also suggested that flushing should be done for “at least 5 to 6 minutes at the beginning of each day” and for 30 seconds between clients.⁷ Interestingly, in the United States where water is deemed potable when there are fewer than 200 CFU/mL, “the effectiveness of flushing has been challenged” since “the layer in immediate contact with the biofilm” remains stationary “during flushing.”² A recent study evaluated time-dependent waterline flushing and concluded that there is a statistically significant reduction in the number of CFU/mL after 2-, 3-, and 4-minute flushing compared with baseline samples and between each time interval. However, after four minutes of continuous flushing, the level of CFU/mL still exceeded the ADA recommendation and upon examination of the tubing by scanning electron microscopy, a residual biofilm remained.⁸ Another study reported that “flushing for 20 minutes... reduce(d) the bacterial count to zero;” however, within 30 minutes, the bacteria count returned to the “pre-flush range.”² The Organization for Safety and Asepsis Procedures (OSAP) “cautions that flushing” alone should only be used “as an interim measure until more effective methods” can be implemented.⁹

There are other possible approaches to reduce the risk of contamination. These include anti-retraction valves, filtration, independent water systems, autoclavable systems, chemical disinfectants, and water testing.^{1,2} Each approach has both advantages and disadvantages that will be discussed separately.

Anti-retraction valves limit the “re-aspiration of fluid from the oral cavity that occurs when negative pressure is generated on stopping equipment” and are most effective “when fitted immediately distal to the handpiece.”² However, they

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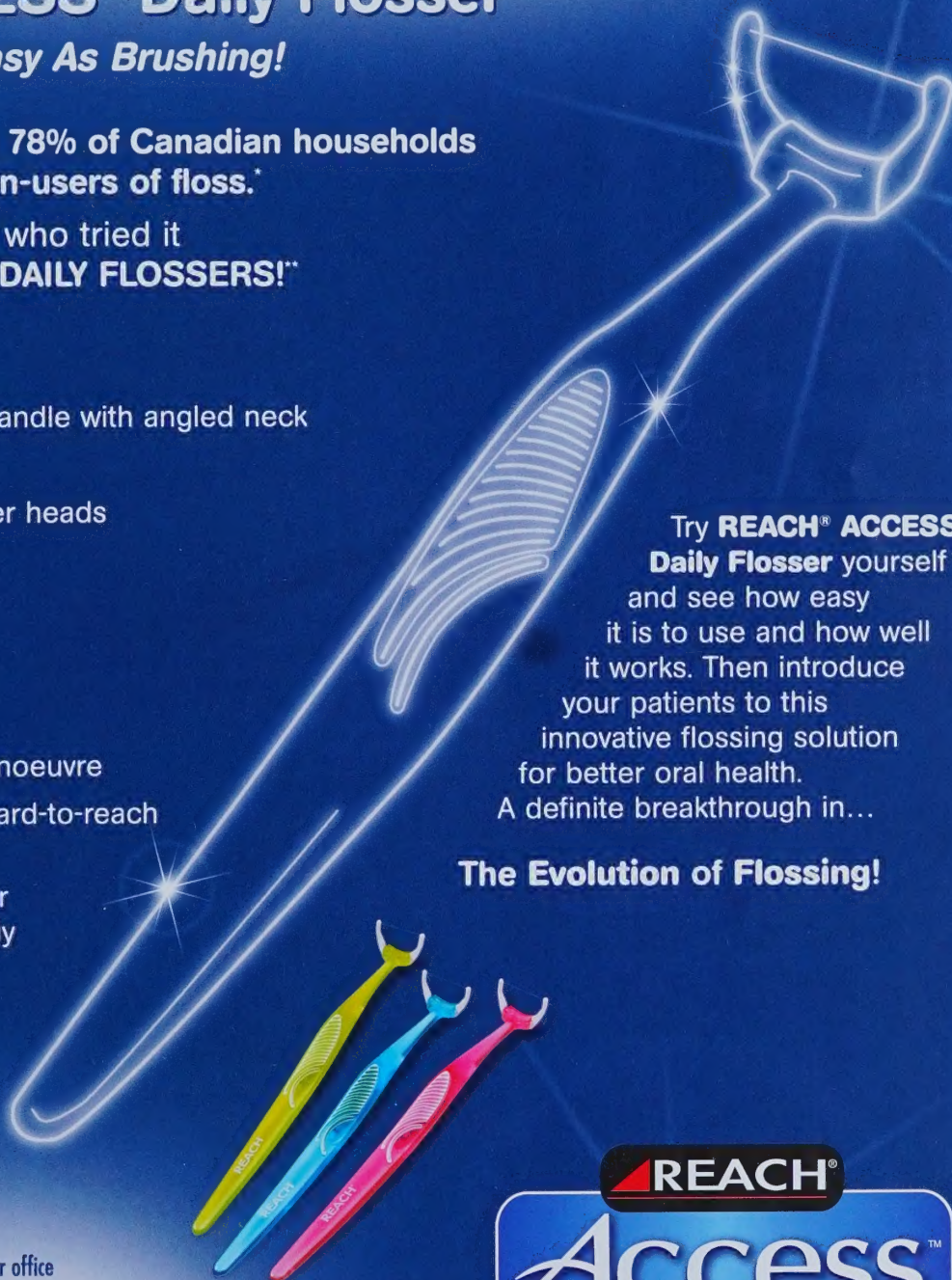
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can become clogged "due to biofilm deposition ...[and] require regular maintenance and programmed replacement."² The potential for microbial cross-contamination led to the creation of the American National Standard Institute-American Dental Association Specification No. 47 in 1984, which specified that "water should not retract more than 2.032 cm back into the handpiece," setting a standard for anti-retraction valve placement.⁴ To avoid reverse flow from suction tips, the College of Hygienists of British Columbia recommends that clients not close their lips and form a seal around the tip unless the tube is safety designed to this problem.¹⁰

Filtration systems remove bacteria from treatment water by means of 0.2-micrometer membrane filters. A variety of filter types are available and are most effective when fitted immediately distal to the handpiece. "Some filters offer a built-in antiretraction valve, iodine-eluting resin to inhibit downstream biofilm formation and filter materials designed to remove bacterial endotoxin."⁵ The frequency for replacing filters varies depending on the type of filter used.⁵ One study "demonstrated that high levels of recontamination of DUW occur within 24 hours" due to "trapping and growth of bacteria on the filters. Therefore disposable filters are recommended" and they should be changed daily.⁴ It is recommended that filters be used in conjunction with another method to control biofilm formation.⁵ Another study evaluated the effectiveness of several disinfectants in combination with filters and concluded that "gluteraldehyde T4 was able to reduce the bacterial contamination" to less than 200 CFU/mL after a two-week maintenance program with the disinfectant being injected by a pump. However, to maintain water quality with the use of gluteraldehyde T4, "periodic biofilm removal" was necessary.¹¹ As well, Pankhurst and Johnson advise caution when using gluteraldehyde because of the "sensitisation of the human lung and skin."²

Independent water systems bypass the main connection to the municipal water, utilizing reservoir bottles that provide pressurized sterile or boiled water. These systems require routine disinfection followed by flushing with sterile water, flushing between clients, and draining and "purging with air or ethanol...to prevent biofilm proliferation due to desiccation."² Other independent water systems using distilled water require daily treatment with an antimicrobial agent such as Listerine Antiseptic, Bio 2000, Rembrandt, Dentosept, or 0.5% sodium fluoride to reduce microbial contamination to the acceptable level. However, the biofilm is not completely eliminated by this means and other methods would have to be employed.¹² A recent product review by Panagakos et al. indicates that Zerosil is an extremely effective, economical, and easy to use cleaning product for the elimination of viable organisms and biofilms in any reservoir bottle delivery system. However, it is still recommended to flush waterlines for "two to three minutes at the beginning of each day and for 20 to 30 seconds between each patient" along with the use of anti-retraction valves.¹³ The use of a "1:50 concentration of LA [Listerine Antiseptic] and sterile distilled water...with new tubing" was shown to be effective at maintaining microbial levels at less than 200 CFU/mL for prolonged periods. It was suggested, "since antimicrobial LA is safe for patient use, it may be one of the most viable options."¹⁴

Fully autoclavable systems for dental units are independent water systems that deliver sterile water when properly maintained. They have "water reservoirs, ...dental unit waterline tubing and fittings to be sterilised between patients" to prevent biofilm formation.² Other systems have disposable tubing. These systems are effective when the instructions are strictly followed. However, they are "expensive to purchase and operate maintain and often are less convenient" to operate compared with other alternatives.⁵

Chemical disinfectants can reduce bacterial counts to an acceptable level, but they do not produce sterile water. Some common disinfectants used include sodium hypochlorite, ozone, hydrogen peroxide, chlorhexidine gluconate, ethanol, povidine iodine, Cavicide, gluteraldehyde, Listerine Antiseptic, Peridex, Sterilex Ultra, Sanosil and hydroperoxide ion phase catalyst (HPI-PTC). They can be introduced either intermittently, on a weekly basis, or continuously, on a daily basis, depending on the product.^{5,15-17} Of these products, the latter three hydrogen peroxide-based disinfectants seem to be the most popular in recent studies in the effort to control microbial levels and biofilm elimination.¹⁵⁻¹⁸ One must, however, closely evaluate the available products, as most just reduce the microbial count and only a few eliminate the biofilm. One study demonstrated that both Sterilex Ultra and bleach eliminated 90% of biofilm after one treatment, while Cavicide, Listerine Antiseptic, and Peridex resulted in "negligible elimination."¹⁶ Another study between Sterilex Ultra and Sanosil showed that both reduced biofilm formation with weekly use; however, repeated usage of Sterilex Ultra was "associated with clogging of DUWs in some dental chair units after repeated usage."¹⁵ A 5% solution of HPI-PTC successfully cleared biofilm after an initial three-day treatment and then maintained the recommended microbial levels with weekly use.¹⁷ Caution should be exercised with chemical products, however, as Barbeau notes: "the manufacturer of the dental unit should be consulted before any chemicals are introduced into the water system."¹ The bacterial colonies in the biofilm will develop a resistance to biocides with extended exposure, therefore reducing their value.²

Water testing after the initiation of a treatment program can determine whether water quality is acceptable, whether the program is worthwhile, and can help identify problems. Barbeau comments that "pretesting dental unit water is virtually useless, as it is unlikely that water from any untreated dental unit will be free of microorganisms."¹ "Routine testing for specific organisms such as *Pseudomonas* and *Legionella* is not recommended" and "should only be performed to investigate a suspected waterborne illness as directed by local health authorities."⁹

Currently, there is "no...single method or device (that) will completely eliminate...dental unit waterline (contamination) or prevent the risk of cross infection." It is therefore advisable to employ a combination of a disinfectant integrated with periodic biofilm removal for water quality maintenance.^{2,9} Also, organizations such as the College of Dental Hygienists of British Columbia recommend that clients not be provided drinking water from the air/water syringe.¹⁰ If choosing a chemical agent, one must ensure that the manufacturer supplies the Material Safety Data Sheet as well as any "other pertinent information...required by OSHA." This is

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1. Platt K, Moritis K, Johnson MR, Berg J, Dunn JR. Philips Oral Healthcare. *Am J Dent* 2002;15(Special Issue):18B-22B. (versus Sonicare Advance)

2. Hope CK, Wilson M. University College London, Eastman Dental Institute. *Am J Dent* 2002;15(Special Issue):7B-11B. (in vitro study versus Braun Oral-B 3D)

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4. 2002 U.S. Survey data

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DENTAL HYGIENISTS' PROFESSIONAL OBLIGATIONS

As set out in the Standards of Practice of the College of Dental Hygienists of Ontario,¹⁹ dental hygienists have many obligations to their clients related to the issue of dental unit waterline contamination. Dental hygienists have the responsibility to "maintain and apply current knowledge and skills" within their practice setting. In order to achieve this, hygienists must "gather, record and analyse the scientific data" available on dental unit waterline contamination and the proposed recommendations.¹⁹ To do this, hygienists must understand the concept of evidence-based decision-making and be able to effectively interpret the validity and reliability of report findings.

By completing a critical appraisal of the literature, hygienists are able to "choos[e] and us[e] any new product or technique that is supported by sound and scientific principles and that has demonstrated safety and effectiveness when used according to manufacturer's directions," thereby "ensuring the practice environment meets all legal requirements for workplace health and safety."¹⁹

The Ontario Code of Ethics states that dental hygienists shall "commit to the highest level of professional efficacy through the maintenance and application of current, relevant knowledge and skill." Therefore, dental hygienists must be knowledgeable regarding microbial contamination and biofilm formation in waterlines, and have an obligation to demonstrate this knowledge by incorporating the established results of scientifically sound methods that are recommended to prevent or control the microbial contamination of the waterlines within their practice.²⁰

The quality of water dispensed from dental unit waterlines is important since clients and dental personnel are routinely exposed to the water and aerosols that are generated from the dental unit. As the ADA Council on Scientific Affairs warns, the "dental profession must continue its awareness of the presence of high levels of opportunistic microorganisms in dental unit water. Despite the lack of evidence of adverse health effects related to these microorganisms, they have the potential to overload the defense systems of immunocompromised patients and occupationally exposed dental staff members."⁵

CONCLUSION

Once one of the scientifically recognized methods or techniques for dental unit water maintenance has been chosen, it must be practised and monitored routinely to protect the health and safety of all clients. Equipment devices and solutions must have "clearly written precautions and instructions for installation, use, and maintenance" to improve "the probability of clinical success and reduce the potential" for equipment damage or personal injury.⁹

In this paper, various methods and techniques for waterline maintenance have been briefly discussed. Individual hygien-

ists have to determine which method or methods are the most reliable, economical, and suitable for their dental practice. By reviewing the literature, implementing and monitoring a method or technique, hygienists will be fulfilling their obligations to the profession and the public as set out by the Ontario Standards of Practice and the Code of Ethics published by the College of Dental Hygienists of Ontario and the College of Dental Hygienists of British Columbia.

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appellent pour nous communiquer leurs commentaires et leurs opinions, soit de façon spontanée, soit avec des commentaires plus formels sur des sujets particuliers, comme les exposés de principe.

- Au cours des prochains mois, on vous demandera de faire vos commentaires sur une étude qui examine le lien entre la santé bucco-dentaire et la santé générale, sur une autre traitant de l'abandon de l'usage du tabac et sur des révisions apportées aux règlements de l'ACHD.
- De courts sondages seront bientôt dans la section réservée aux membres du site Web, où vous pouvez faire connaître vos opinions sur divers sujets, clairement et sans délai.

Pour parler avec la voix de l'intelligence, nous développons des énoncés de position et des publications solidement soutenues par la recherche. Celle-ci permet également à l'ACHD de faire des présentations publiques et de prendre part à des efforts de coalition.

Cette « voix collective » s'avère-t-elle un but idyllique ou marquons-nous des progrès lorsque nous mettons cette mission en action ? Examinons maintenant quelques initiatives nationales récentes où la voix de l'hygiène dentaire s'est fait entendre avec force :

Activités de coalition

- *La coalition pour la santé publique au 21^e siècle.* Comme membre de cette coalition, l'ACHD travaille avec d'autres membres à influencer les politiques gouvernementales pour s'assurer que le système de santé publique soit adéquat. Un tel système s'occupera de protection et de promotion de la santé, de prévention des maladies et des blessures et fournira l'information nécessaire permettant de maintenir et d'améliorer la santé de la population canadienne. En groupe, nous avons rencontré Carolyn Bennett, maintenant secrétaire d'État à la Santé publique ; nous avons fait des commentaires, à la demande de monsieur Pierre Pettigrew, ministre de la Santé, au comité consultatif du nouveau Bureau de la santé publique ; et nous avons fait un sondage auprès du public concernant ses vues sur la santé publique.
- *L'Alliance pour la prévention des maladies chroniques du Canada (Chronic Disease Prevention Alliance of Canada - CDPAC).* La CDPAC a pour but de définir un système national intégré pour la prévention des maladies chroniques, de concert avec des intervenants clés, au niveau national et provincial/territorial. Cette alliance a obtenu une subvention substantielle pour promouvoir la prévention dans les soins de santé primaires ; et elle prépare la première conférence annuelle de prévention de la maladie chronique au niveau national.
- *La Coalition des professions de la santé pour une pratique préventive. (Coalition of Health Professions for Preventive Practice).* Cette coalition, un forum interdisciplinaire d'organismes nationaux de professionnels de la santé et Santé Canada, est un « groupe de réflexion » visant à améliorer la promotion de la santé et les services de prévention de la maladie chez les professionnels de la santé.

- *Le comité de planification du Programme national sur l'alphabétisation et la santé de l'Association canadienne de santé publique.* Ce comité fait la promotion de la sensibilisation, chez les professionnels de la santé, des liens entre l'alphabétisation et la santé ; et il prépare présentement la deuxième conférence canadienne sur l'Alphabétisation et la santé (Ottawa, 17 au 19 Octobre 2004).
- *Association canadienne de santé dentaire publique (CASDP).* Membre de cette association.
- Au nom d'une coalition souple de six organismes, nous avons fait parvenir une lettre au comité permanent des Finances en lui demandant de presser le ministre des Finances d'amender la *Loi de l'impôt sur le revenu* afin d'élargir les critères de qualification des crédits d'impôt pour études.

Réponses à des questions de fond

- Questions et réponses sur le module d'éducation portant sur le détartrage à l'intention des assistantes dentaires ;
- Questions en réponses sur le cadre de politiques pour l'éducation en hygiène dentaire ;
- Questions et réponses sur l'offre, la demande et le besoin d'hygiénistes dentaires ;
- Réponse aux « Messages clés d'hygiène dentaire » de l'Association dentaire canadienne ;
- Lettre au ministre fédéral de la Santé, aux premiers ministres et aux ministres provinciaux de la Santé, établissant certains critères pour un Conseil national de la santé ;
- Lettre aux premiers ministres leur demandant de mettre en œuvre certaines des recommandations Romanow ;
- Lettre au ministre de la santé du Nouveau-Brunswick protestant contre le changement proposé de la Société dentaire du N.-B. pour élargir la portée de pratique des assistantes dentaires en y ajoutant le détartrage.

Documents de breffage à l'intention du gouvernement

- *Comité permanent sur la Santé.* L'ACHD a fait une présentation verbale sur la santé bucco-dentaire des Premières nations et des Inuits et a agit comme témoin expert. Le comité a appuyé les nouveaux modèles proposés pour la prestation des soins de santé, qui visent à faire un meilleur usage des services de prévention en hygiène dentaire.
- *Comité des Finances.* L'ACHD a fait huit recommandations pour les dépenses fédérales, en matière de santé buccale, et trois recommandations pour des changements en éducation de l'hygiène dentaire, y compris des déductions d'impôts pour les dépenses d'éducation permanente.

Énoncés de principe

- */Access Angst/:* Ce document relatif à l'accès aux services de santé buccale examine plusieurs groupes différents de sous-population, dont le faible revenu, les personnes vivant en milieu rural, les Autochtones, le multiculturalisme ainsi que les handicapés physiques et mentaux. Il a également examiné les programmes publics et les problèmes systémiques.

- *Programme de recherche.* Les participants ont examiné un vaste éventail de ressources, documenté une gamme étendue de sujets de recherche en santé bucco-dentaire au sein d'un cadre de recherche reconnu au Canada ; et il a identifié des recommandations pour la recherche en hygiène dentaire.
- *Dialogue sur le fluorure.* Ce document résume la recherche qui a aidé le conseil d'administration de l'ACHD à élaborer ses énoncés de position sur le fluorure, présentant et évaluant la preuve pour et contre l'usage du fluorure.
- *Cadre de politiques pour l'éducation en hygiène dentaire au Canada en 2005.* Ce document souligne les bornes, les paramètres et les éléments essentiels de l'éducation en hygiène dentaire au Canada. Il reflète la transition de l'hygiène dentaire d'un métier de la santé à une profession de la santé.

Interventions

- L'ACHD parraine et participe au symposium "Access and Care: Towards a National Oral Health Strategy", à Toronto, en mai 2004. Cette initiative, organisée par la Toronto Oral Health Coalition du George Brown College et de l'Université de Toronto est le tout premier symposium à se dérouler sur les politiques en matière de

santé bucco-dentaire.

- L'ACHD a fait des commentaires sur les thèmes de stratégie nationale de santé buccale des directeurs dentaires fédéraux, provinciaux et territoriaux.
- La stratégie nationale concernant les réclamations électroniques est coordonnée par l'Institut canadien de renseignements sur la santé. L'ACHD participe activement aux travaux du Groupe d'intérêts spéciaux en santé buccale qui voit à ce que les besoins des hygiénistes dentaires trouvent des réponses dans l'avenir au moyen de soumissions de réclamations électroniques, pour des services d'hygiène dentaire, à des tiers payeur.
- L'étude du secteur de la santé bucco-dentaire est un examen important des ressources humaines financé, par Développement des ressources humaines Canada ; elle examine les facteurs de l'offre et de la demande pour les hygiénistes dentaires, les dentistes, les assistantes dentaires, les technologues dentaires et les denturologistes. L'ACHD joue un rôle actif dans cette étude qui nécessitera trois ans, prévoit-on.

Nous travaillons en votre nom. Faites votre part pour participer, partager vos points de vue et faire en sorte que notre voix collective en demeure une qui soit informée et intelligente. 

"THE COLLECTIVE VOICE" (continued from page 55)

overall health and another dealing with smoking cessation, and on revisions to CDHA's bylaws.

- Short surveys will soon be on the members' side of the web site where your views on various subjects can be made known clearly and with no delay.

To speak with the voice of intelligence, we are developing position statements and publications that are strongly supported by research. This research also enables CDHA to make public presentations and take part in coalition efforts.

Is this "collective voice" an idyllic goal or are we making strides in putting this mission into action? Let's look at some recent national initiatives where the dental hygiene voice is being heard strongly:

Coalition activities

- *Coalition for Public Health in the 21st Century.* As a member of this coalition, CDHA works with other members to influence government policy to ensure an adequate public health system. Such a system will protect and promote health, prevent disease and injury, and provide the necessary information so the health of Canadians can be maintained and improved. As a group, we met with Carolyn Bennett, now the Secretary of State for Public Health; provided input, as requested by Pierre Pettigrew, MOH, to the advisory board for the new Public Health Agency; and survey the public about their views on public health.
- *Chronic Disease Prevention Alliance of Canada (CDPAC).* CDPAC aims at defining a national integrated system for chronic disease prevention together with key national and provincial/territorial stakeholders. This alliance obtained a large grant to promote prevention within pri-

mary health care and is planning the first annual nationwide chronic disease prevention conference.

- *Coalition of Health Professions for Preventive Practice.* This coalition, an interdisciplinary forum of national health professional organizations and Health Canada, is a "think tank" to improve health promotion and disease prevention services of health professionals.
- *National Literacy and Health Program Planning Committee, Canadian Public Health Association.* This committee promotes awareness among health professionals of the links between literacy and health and is currently planning the second Canadian Conference on Literacy and Health (Ottawa, October 17-19, 2004).
- *Canadian Association of Public Health Dentistry (CAPHD).* Member of this association.
- On behalf of a loose coalition of six organizations, we sent a letter to the Standing Committee on Finance, urging it to recommend that the Minister of Finance amend the *Income Tax Act* to broaden the qualifying criteria for the Education Tax Credit.

Responses to key issues

- Q & A's on the scaling education module for dental assistants;
- Q & A's on the Policy Framework for Dental Hygiene Education;
- Q & A's on the supply of, and demand and need for dental hygienists.
- Response to the Canadian Dental Association's "Dental hygiene key messages";
- Letter to the Federal Minister of Health, First Ministers, and Provincial Ministers of Health, establishing some criteria for a National Health Council;

- Letter to First Ministers, asking them to implement some of Romanow's recommendations;
- Letter to the New Brunswick (NB) Minister of Health, protesting the N.B. Dental Society's proposed change to increase the scope of practice of dental assistants to include scaling of teeth.

Government briefs

- *Standing Committee on Health.* CDHA made an oral presentation on First nations and Inuit Oral Health and acted as an expert witness. The Committee supported the proposed new models for oral health care delivery to make better use of dental hygiene preventive services.
- *Finance Committee.* CDHA made eight recommendations for federal spending on oral health, and three recommendations for changes in dental hygiene education, including tax deductions for continuing education expenses.

Position Statements

- *Access Angst.* This paper on access to oral health services examines several different subpopulation groups, including low-income, rural, Aboriginal, multicultural, and physically/mentally disabled. It also looks at public programs and system issues.
- *Research Agenda.* Participants reviewed an extensive range of resources, documented a broad range of oral health research topics within a framework of research recognized in Canada, and identified recommendations for dental hygiene research.
- *Fluoride Dialogue.* This paper summarizes the research that assisted the CDHA Board of Directors in developing fluoride position statements, presenting and assessing the evidence for and against the use of fluoride.

- *Policy Framework for Dental Hygiene Education in Canada 2005.* This document outlines the boundaries, parameters, and essential elements of dental hygiene education in Canada. It reflects the transition of dental hygiene from a health occupation to a health profession.

Advocacy

- CDHA is sponsoring and participating in the symposium "Access and Care: Towards a National Oral Health Strategy" in Toronto in May 2004. This initiative, organized by the Toronto Oral Health Coalition, George Brown College, and University of Toronto is the first ever symposium on oral health policy.
- CDHA has provided input into the themes of the Federal, Provincial, Territorial Dental Directors National Oral Health Strategy
- The National e-Claims Strategy project is coordinated by the Canadian Institute of Health Information. CDHA is an active participant in the Oral Health Special Interest Group ensuring the needs of dental hygienists will be met in the future with electronic claim submissions for dental hygiene services to third-party payers.
- The Oral Health Care Sector Study is a major human resources study funded by Human Resources Development Canada examining supply and demand factors for dental hygienists, dentists, dental assistants, dental technologists, and denturists. CDHA is playing an active role in this study, which is anticipated to take three years to complete.

We are working on your behalf. Do your part to participate, share your views, and ensure our collective voice remains an informed and intelligent one. 

"NOUS AVONS BESOIN DE VOTRE AIDE !" (suite de la page 51)

provinciales, la présidente et la directrice générale de l'ACHD ainsi que des représentants de la Federation of Dental Hygiene Regulatory Authorities, du Bureau national de la certification en hygiène dentaire, des Dental Hygiene Educators Canada et des Forces armées canadiennes. Ce groupe représentait bien les parties intéressées qui ont fait valoir leurs idées sur les sujets à l'étude. J'aimerais remercier tous les participants qui se sont joints à nous, à Calgary, pour communiquer leur rétroaction et leurs conseils à l'ACHD relativement à son avenir.

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On a ensuite utilisé l'information recueillie à cet atelier interactif pour rédiger les nouveaux règlements de l'ACHD. Et c'est à ce point-ci que vous, nos membres, entrez dans le processus ! L'ébauche des règlements sera affichée sur notre site Web, www.cdha.ca, pour vous permettre de l'étudier et de la commenter. En raison des frais postaux élevés, nous avons décidé de ne pas en envoyer un exemplaire à chaque membre de l'ACHD. Toutefois, si vous en voulez un, il suffit de nous appeler ou de nous envoyer un courriel. C'est l'occasion de nous faire part de vos opinions sur l'ébauche du document. Nous avons besoin de vos commentaires pour s'assurer que les règlements répondent à vos besoins, que vous puissiez vous en accommoder et que le texte soit complet.

Après avoir reçu tous vos commentaires et apporté les changements nécessaires, le conseil préparera l'ébauche finale à soumettre aux membres à St. John's (Terre-Neuve et Labrador), en juin 2004 (dans le cadre de la conférence annuelle). Les membres se prononceront alors sur le sort des nouveaux règlements.

Veuillez prendre quelques minutes pour parcourir l'ébauche du document lorsqu'il sera affiché sur le site web (section Réserve aux membres) — l'Association vous avertira de sa disponibilité. Faites vos commentaires et assurez-vous que vos opinions soient entendues et prises en considération !

On peut communiquer avec Patty Wickstrom à l'adresse president@cdha.ca. 

Differences in Masculine and Feminine Perceptions of Quality of Life and Oral Health

by Audrey Penner,* MEd, BSc, DipDH,
and Dr. Vianne Timmons,**PhD

ABSTRACT

The relationship between oral health and quality of life has been explored recently in order to ascertain the relevance of one to the other. When looking at seniors' oral health, the question of quality of life becomes more significant due to the special oral health issues seniors face. What has not been explored is the relationship that gender may have to perceptions of quality of life and oral health. This Prince Edward Island study surveyed 275 seniors living in independent housing facilities. The survey instrument was the Subjective Oral Health Status Indicators survey, developed by Dr. David Locker of the University of Toronto. This survey tool has been tested for validity and reliability and has been in use for approximately 10 years. The cross-sectional design of the survey randomly sampled seniors from every geographic region of P.E.I. Survey results showed that four of the eight topics in the survey had a significant difference in gender responses. Males represented 18.2% of the respondents, females 76.4%. While this does not reflect the male-to-female ratio of seniors in the general population, it does reflect the male-to-female ratio within independent housing for seniors in P.E.I. Using a t-test, the gender relationship was identified within four topic areas: ability to chew, other oral symptoms, social impact, and activities of daily living. Correlational analysis identified relationships between all the topics with one or both of the demographic variables—age and number of teeth.

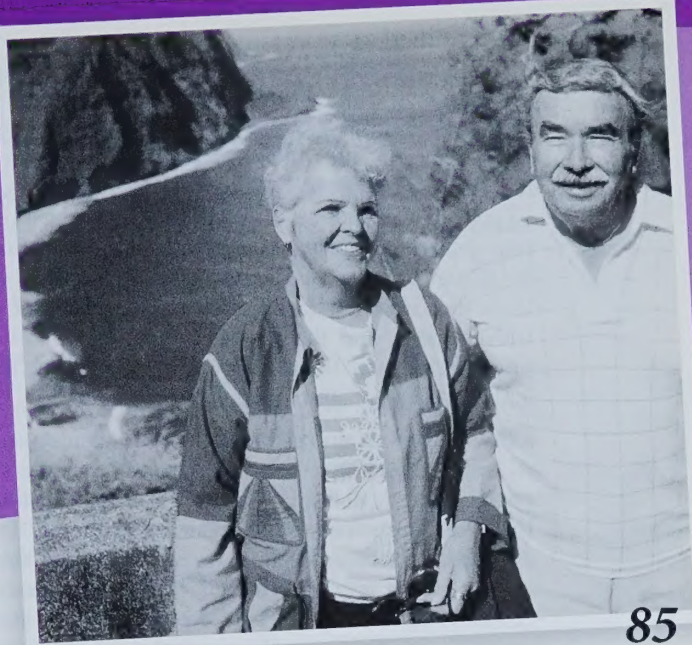
Keywords: Oral health, quality of life, gender, oral cancer, seniors, older adult, elderly, oral symptoms, daily activities, self-reported oral health outcomes

INTRODUCTION

The relationship of oral health to quality of life has increasingly been the subject of discussion.¹ However, little information is available about the perception of this relationship according to gender. On Prince Edward Island, researchers studying seniors to determine their worry or concern about oral health and quality of life found perceptual differences between the sexes in specific areas of oral health and quality of life attitudes. The seniors studied were living in non-institutionalized public housing.

* Doctoral student at the University of Calgary and Learning Manager with the Holland College Dental Assisting Program in Prince Edward Island.

** Vice President, Academic Development, University of Prince Edward Island



There is no universally accepted definition of quality of life.² Rather, there are perceptual constructs that can be applied or interpreted depending on the framework used. For the purposes of this paper, the operational definition of quality of life is "the measure of life by an individual within the context of informed understanding of what their life could be." When discussing oral health as it relates to quality of life, it must be clearly stated that oral health is a significant factor in overall health. Health is recognized as a measure of quality of life regardless of the framework or perceptual construct utilized.³ A recognition of health as a state of being that allows a person to function at optimum capacity is a more comprehensive view of health as opposed to the mere absence of disease. Thus, when looking at oral health within this context, the same dimension applies—oral health is an optimum state and not merely the absence of disease. How does gender impact on this type of study? Is there a masculine/feminine perspective related to oral health and quality of life? If we recognize different perceptions, can we then use that knowledge to assist in our delivery of client care in our dental hygiene practices?

Oral health measures are positively correlated with measures of general health.⁴ However, oral health has yet to become a general indicator of overall health, as measured through health evaluations. Self-reported issues, such as periodontal breakdowns, and oral symptoms that impair the ability to function or that contribute to a systemic disease process would appear to contribute to lack of overall health.⁴

A healthy mouth is the premise for overall health,⁵ but perceptions of oral health have not been explored in relation to gender differences. The concept of prevention of dental disease is over 50 years old, but the terminology and philosophy of the concept has not necessarily grown to encompass gender-specific practices. The average dental hygiene practitioner applies theories of prevention based on the condition in the mouth. But there may be more to this application than the mere assessment of oral conditions; it is also important for the dental hygiene practitioner to consider the male/female perception of needs as part of the case-based approach when delivering services.

The oral cavity can be a mirror image of other areas of the body; many systemic illnesses are manifested in the soft tissue or oral mucosa of the mouth.⁶ There are increasing oral health concerns due to the fact that more people are living longer and therefore more teeth will require maintenance for a longer period of time. This will be accompanied by a corresponding increase in health concerns and therefore quality-of-life concerns for seniors.⁷ With the expected increase in the incidence of diabetes, the longer lifespan of persons with diabetes, and the associated periodontal conditions, more periodontal therapies may be required to maintain oral health and quality of life.

About 95% of all oral cancers occur in patients over age 40 with the incidence increasing with age.⁸ Statistics Canada reports the probability of oral cancer in seniors increasing with each five-year cohort, beginning at age 65. The incidence of oral cancer for males is double that of females in any age cohort over the age of 65.⁹ With an increased number of elderly in our population, we can expect an increase in oral disease in the future.¹⁰

Levels of oral cancer have remained roughly the same over the past decade. However, given the dental industries' ability to give an early diagnosis, one would have hoped for a greater decline in incidence than has been experienced. Matear expresses a concern about a probable increase in lip cancer.¹⁰ How this will translate into gender differences has yet to be seen.

With this knowledge about increases in lip cancer, and our information around gender specificity in probability rates, the differences in male and female perspectives on oral health and quality of life needs exploring. Within this study, gender perceptions of oral health and the quality of life are compared with interesting findings on the differences in perception.

METHOD

This study was a survey designed to determine oral health indicators. The Subjective Oral Health Indicators¹¹ measured the questions asked around oral health and perceptions of quality of life. (See Appendix for survey questions.) With the addition of a demographic sheet to determine age, number of teeth, and gender, the dependent variables could be compared with the independent variables using the statistical analysis program SPSS. The survey was administered through the Prince Edward Island Residential Housing Authority.

Subjects were selected in a cross-sectional cluster sample representing geographic distribution across the province. Prince Edward Island seniors function on average at a Grade 8 literacy level. The survey instrument chosen is user friendly and suitable for this reading level. It covered topics such as the ability to chew and to speak, oral and facial pain symptoms, other oral symptoms, the ability to enjoy eating, social relationships, activities of daily living, and worry/concern. Responses to these topics were analyzed to determine seniors' perception of oral health and quality of life.

Seniors on P.E.I. represent 12.8% of the Island's population.¹² To achieve a sufficient number of responses, the study targeted 40% of the 1,000 seniors living in public housing supplied by the Prince Edward Island Residential Housing

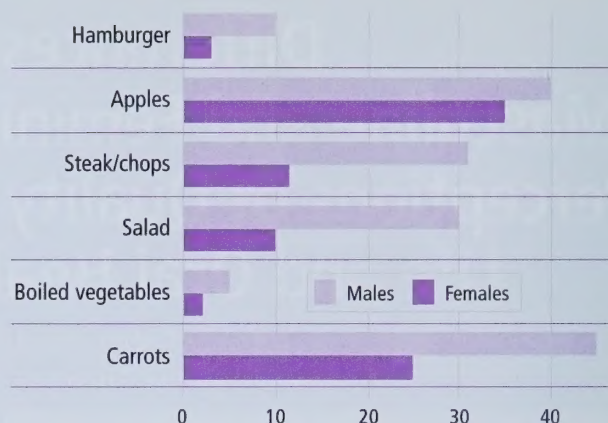


Figure 1. Differences in ability to chew

Authority. Overall, 547 surveys were delivered to seniors in various housing units across the province. There were 275 surveys returned, representing a 52.1% response rate. The response rate was slightly higher in one geographic region at 55% although this region showed no significant difference in demographic makeup. Given the population surveyed, the 52.1% rate was considered acceptable.

Analysis of the data included Pearson's correlation that determined the extent of the relationship between the independent and dependent variables, and a t-test that compared the responses from the two groups—males and females. Demographic variables provided by the respondents included geographic location, age, gender, and number of teeth present.

FINDINGS

Of the 275 respondents, 76.4% were female and 18.2% male, with 5.4% not responding to this question. Males were underrepresented in this study when compared with the male-to-female ratio of seniors on P.E.I. However, this ratio does echo the ratio of males to females within the residential population of the P.E.I. Housing Authority. The mean age of the respondents was 74.3 years (SD 10.356) with ages ranging from 54 to 95 years old. Of the persons responding, 51% were edentulous; this compares closely with statistics from other regions including the United States. The mean number of teeth reported was 6.44 (SD 8.53); the most frequently reported number was zero. A small number of the participants (2.4%) reported that they had "all their teeth."

In four of the eight topics within the survey, the t-test to compare gender responses indicated a significant difference in the patterns of answers. The four topics that had significant differences were (1) the ability to chew, with a probability significance of 0.05; (2) other oral symptoms ($p < 0.021$); (3) social impact ($p < 0.05$); and (4) activities of daily living ($p < 0.01$). Concerning the ability to speak, the t-test did not identify any significant difference between genders. However, there were some interesting ratios in the percentage of responses.

When reporting the ability to chew, males were more than twice as likely to indicate chewing dysfunction than females. Specific food items were more notable than others. Figure 1 shows the responses to inquiries about the difficulty chewing carrots, boiled vegetables, salad, steaks/chops, apples, or

hamburgers. In all categories of foods, males identified more chewing difficulty than did females.

When reporting other oral symptoms, women were more likely to identify specific problems in their mouths. Although no single symptom can give a diagnosis of oral health, it would appear women had more problems when it came to mouth ulcers, cold sores, sore gums, and bleeding gums, to name a few. In many cases, the identification of problems by women was double or triple the number of identifications by males. With just two exceptions, females were always higher in their response than males. One of these exceptions was bad breath, where men more than doubled the number of women reporting concern over having experienced bad breath in the past four weeks. The other exception was dry mouth with 43% of females and 45% of males identifying dry mouth as a concern during the past four weeks. Figure 2 shows the item-by-item comparison of responses.

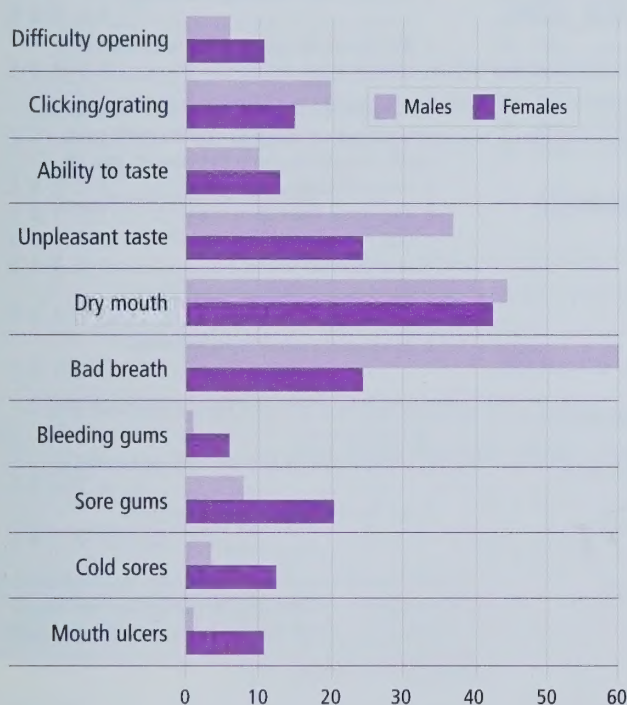


Figure 2. Differences in reporting oral symptoms

In terms of social impact, the significant difference between genders related to interaction in social situations. Men tended to be more concerned about embarrassment caused by the appearance of their teeth or mouth, while females showed more concern about conversation with others. Participants were also asked if they avoided eating with other people, laughing, or smiling. The females were more likely to be concerned with these issues than were males.

When it came to activities of daily living, again males were more likely to report concern about certain items such as staying home more than usual or avoiding leisure activities. Women were more likely to be concerned about their ability to complete household chores. While there was no significance in the difference in responses, the topic of ability to speak showed some interesting patterns in the male/female responses. The percentage of responses by gender is presented in Figure 3.

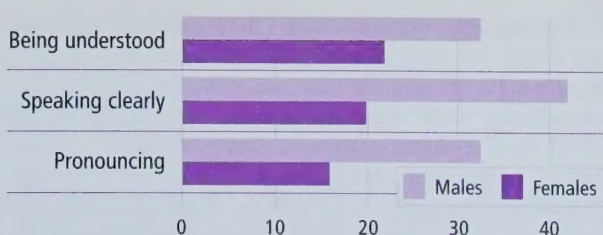


Figure 3. Differences in ability to speak

DISCUSSION

Men were more likely to respond to those issues that affected them personally, such as foods they could enjoy, meat, steak etc. Communication, pronunciation of words, and speaking clearly also appeared to be of concern to them. Women were more likely to report issues that involved pain or discomfort. Does this mean women will seek help earlier to ensure the discomfort or pain is addressed? There are many reasons why males may have a higher incidence of oral cancer—more exposure to cigarette smoke or alcohol, etc. However, oral cancer in senior males may be more advanced because of a reduced likelihood of males reporting symptoms such as bleeding gums, sore gums, or mouth ulcers. One indicator of a lower value placed on preventive practices and self-reporting health issues is lower educational attainment and this factor does apply to this population. Another indicator is being male.¹³ When working with males, the dental hygiene practitioner may have to make specific inquiries to ascertain what the client has been experiencing at home. Females may be more forthcoming with this information. More probing questions may be required to elicit the same information from senior male clients. It should be noted here males were underrepresented according to the male-to-female ratios on P.E.I. for persons over the age 50. The findings may be a reflection of the underrepresentation.

When discussing difficulties in chewing, the dental hygiene practitioner may wish to ask about specific foods when talking to men. Foods such as steak, chops, and hamburger may get a response more quickly than inquiring about the difficulty of eating raw vegetables. Concerns centring around food and the ability to eat will give some insight into the needs of the client in terms of oral health.

The specific symptom of dry mouth appeared to get an equal response from both genders. Dry mouth is a natural process of aging with possible additional complications due to systemic illness or medication.¹⁴ Dry mouth is a significant threat to oral health for seniors.¹⁵⁻¹⁷ Based on the results of this study, it appears to be a problem identified to the same degree by females and males.

CONCLUSIONS

Based on the findings of this study, more research is needed on the issue of gender, oral health, and quality of life. Much needs to be known about the “why” of perception differences by gender. Do the perceptions reported here reflect the senior population as a whole? Both qualitative and epidemiological studies could confirm or deny the differences identified in this study. By applying clinical measurements to this population, a better picture of perceived needs as opposed to clinically diagnosed needs would be created.

More awareness is necessary about the issue of self-reporting and males. Are men receiving the treatment they require, based on the symptoms they are experiencing? Do they acknowledge their symptoms to the practitioner in the office? Until a clearer picture of this is available, a dental hygiene practitioner should be alert to the possibility of males underreporting oral symptoms. Many of these symptoms may be indicative of more serious oral disease. Early diagnosis and intervention has long been the key to assist people in having healthier mouths.

Based on the results of this study, the researchers cannot draw firm conclusions about the degrees of difference in gender issues, oral health, and quality of life. However, dental hygienists can offer their clients a more comprehensive service by being aware of gender issues and differences. Quality of life for men and women would be enhanced if delivery of oral services takes into account the different perceptions of male and female seniors.

APPENDIX Subjective Oral Health Status Indicators

Circle yes or no:

1. Are you usually able to:

- a. chew a piece of fresh carrot?..... yes no
- b. chew boiled vegetables?..... yes no
- c. chew fresh lettuce salad? yes no
- d. chew firm meat such as steaks or chops? yes no
- e. bite off and chew a piece of whole fresh apple? yes no
- f. chew hamburger? yes no

2. Thinking about problems with your teeth or mouth, do you ever have difficulty:

- a. pronouncing any words? yes no
- b. speaking clearly? yes no
- c. making yourself understood?..... yes no

3. In the last four weeks, have you had the following problems:

- a. pain in teeth with hot/cold foods or fluids?..... yes no
- b. pain in teeth with sweet foods? yes no
- c. pain in jaw joint while chewing? yes no
- d. pain in jaw joint when opening mouth wide? yes no
- e. pain in face in front of ear? yes no
- f. burning sensation in tongue or other parts of mouth?..... yes no
- g. shooting pains in face or cheeks?..... yes no
- h. pain or discomfort from denture? yes no

4. In the past four weeks, have you had the following problems:

- a. mouth ulcers? yes no
- b. cold sores? yes no
- c. sore gums? yes no
- d. bleeding gums?..... yes no
- e. bad breath? yes no
- f. dryness of mouth? yes no
- g. unpleasant taste? yes no
- h. changes in ability to taste? yes no
- i. clicking/grating noise in jaw joint? yes no
- j. difficulty opening mouth wide? yes no

Circle the number that is best for you:

- 1 means all the time
- 2 means very often
- 3 means fairly often
- 4 means sometimes
- 5 means never

5. Thinking about your health over the last year, how often

- a. have you been prevented from eating foods you would like to eat?.....1 2 3 4 5
- b. have you found your enjoyment of food is less than it used to be?1 2 3 4 5
- c. did it take you longer to finish a meal than other people?.....1 2 3 4 5

6. Thinking about your dental health over the last year, how often

- a. did you avoid eating with other people because of problems with chewing?1 2 3 4 5
- b. were you embarrassed by the appearance or health of your teeth or mouth?.....1 2 3 4 5
- c. did you avoid laughing or smiling?1 2 3 4 5
- d. did you avoid conversation with others?1 2 3 4 5

7. During the past year, how often have pain, discomfort or other problems with your teeth, mouth or dentures caused you to:

- a. have difficulty sleeping?.....1 2 3 4 5
- b. stay home more than usual?.....1 2 3 4 5
- c. stay in bed more than usual?.....1 2 3 4 5
- d. take time off work?1 2 3 4 5
- e. be unable to do household chores?1 2 3 4 5
- f. avoid your usual leisure activities?1 2 3 4 5

8. During the past year, how often have you worried about:

- a. the appearance of your teeth or mouth?1 2 3 4 5
- b. the health of your teeth or mouth?1 2 3 4 5

Thank you for completing this survey. The information you have given is confidential. All information will be put together in a report about seniors and their oral health.

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The 2003



Health Promotion Awards:

Another successful year marked by unique fun

Guinness World Records, a cameo appearance by the tooth fairy, fundraising to promote oral health among the less fortunate, and a gigantic mouth with dozens of gleaming white molars—these are just a few of the clever and creative ways that Canada's dental hygienists celebrated National Dental Hygienists Week (NDHW), October 12–18, 2003.

Every year in connection with this special week, CDHA and Oral-B Laboratories together sponsor the Oral-B Health Promotion Awards, designed to encourage hygienists to promote oral health in their communities. Cash prizes of \$1,000 are awarded to individual contest winners with \$2,000 going to each school and clinic winner. Half of each prize goes to the winner's local dental hygiene chapter.

Read on and you'll notice a common thread—an across-the-board dedication to community, professional excellence, and advocacy of the wellness benefits of proper oral care and dental hygiene.

WINNERS

Individual Category: Harriet Rosenbaum, Winnipeg, Manitoba

Harriet knew just where to place her message promoting NDHW—the local branch of Winnipeg Public Library because it caters to such a vast clientele. Harriet wanted to profile dental hygiene and gave much thought to how people—especially children—could interact with display items to make the information engaging and fun.

She first developed a dental hygiene quiz and distributed copies throughout the library. Then she cut red construction paper into the shape of a large mouth and taped it to a wall in the kids' section. Next she cut white paper into giant "molars" and gave one to every child who completed the quiz. The kids answered the quiz on their special tooth and then pasted it on the big red mouth. The result? A rather spectacular mouth, with dozens of gleaming white teeth.

To entice adults to complete the quiz, Harriet set up a dental hygiene raffle for two special baskets she had prepared her-

**Guinness World Record
for simultaneous dental
flossing—using one
continuous piece of floss!**



Sheila Petrollini (l.) and Veronica Hermiston with the famous 2,500 metres of floss!

self. Each contained various dental hygiene home-care items, including an electric toothbrush.

But Harriet didn't stop there. At the entrance to the library, she developed an eye-catching display case containing a series of fact sheets about dental hygienists and the importance of oral health care.

Clinic Teams Category: Sheila Petrollini, Regina, and Veronica Hermiston, Wynyard, Saskatchewan

What do the following have in common?

- 2,500 metres of minted, shed-proof dental floss
- 1,500 toothbrushes
- 1,254 cups of mouthwash
- 1,500 bottles of hand sanitizer
- 1,146 very enthusiastic students
- 50 equally enthusiastic dental hygiene students from a local college
- 16 highly dedicated dental hygienists

These are among the winning ingredients necessary to set the Guinness World Record for simultaneous dental flossing—using one continuous piece of floss! That's what the students of Regina's Campbell Collegiate did during NDHW 2003.

Who were the masterminds behind this eyebrow-raising plot? Why, Veronica Hermiston and Sheila Petrollini, of course. Consulting the *Guinness Book of Records*, they discovered that the record to beat for simultaneous flossing was 327 people. So they canvassed their community and found an ample supply of participants among the students at Campbell Collegiate. Sixteen dental hygienist volunteers also took part in this activity, coming from Regina and from far across the province.



For everything you do

- [scaling and polishing]
- [perio debridement]
- [fluoride treatments]
- [hand-holding]
- [words of encouragement]
- [words of wisdom]
- [smiling even though your
back is killing you]

We salute you.

We know you work hard to improve your patients' oral health. And it shows—in their smiles. Which is why we go out of our way to provide you with the tools you need to do your job successfully.

Our commitment to you isn't just for today, but every day. We hope you'll continue to take advantage of our many free resources, including helpful patient education materials, Power Seminars, Fluoride Reference materials, and Continuing Education courses.

Thank you for giving us the opportunity to support you and your work.

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precisely

With volunteers and participants in place, there was still the none-too-trivial matter of obtaining the necessary dental hygiene equipment! But where exactly do you find 2,500 metres of minted, shed-proof dental floss? Well, as it turns out, from a plant in Newbridge, Ireland.

Thanks to a generous donation by Oral-B, this made-to-order item (along with Oral-B toothbrushes) was purchased, prepared, and shipped to Veronica and Sheila. In addition, Crest donated four cases of Scope mouthwash, Crosstex International provided 1,500 bottles of hand-sanitizer solution, Ash Temple supplied 1,500 cups, and Sinclair Dental donated an ample supply of nitrile gloves to ensure proper care of participants. The finishing touch? The 2,500-metre spool of floss was packaged in a handmade satin box, about the size of a mid-sized television set.

Yes, they set a Guinness World Record, but did the participants do a *good* job of flossing? Absolutely. To ensure that all flossers were meticulous, the event's 16 dental hygienists and 50 dental hygiene students from the Saskatchewan Institute of Applied Science and Technology monitored the activities.

No word yet on what these two have in store to top this achievement in 2004. We can hardly wait...

Dental Hygiene School Category: Cambrian College Dental Hygiene Program, Sudbury, Ontario

Dental hygienists across Canada and elsewhere have long advocated the importance of oral health and preventive care as part of overall wellness. To mark NDHW 2003, dental hygiene students at Cambrian College decided to turn this belief into action.

Dental hygiene and dental assistant students organized a "Walk for a Smile" fundraising event so kits with oral care and dental hygiene products could be distributed to less-advantaged citizens in the community. Braving the cold, rainy weather of a late-October afternoon in Northern Ontario, over 110 participants walked a five-kilometre route, collecting more than \$2,300 in pledges.

Thanks to these contributions, 500 comfort kits were purchased. Inspired and encouraged by the students' efforts, the Sudbury and District Health Unit contributed 500 toothbrushes to the fundraiser.

HONOURABLE MENTIONS

Tooth fairy and migrating geese: The Kingsville Dental Centre in Kingsville, Ontario, promoted oral hygiene awareness by entering a float in the community's annual Migration Festival that marks the return of the southbound migrating Canada geese. The float's tooth fairy—in a fashionable late-fall white crinoline with wings and wand—was the star, but office staff also distributed Oral-B toothbrushes, stickers, and colouring books to over 700 children who watched the parade.

Smoke-free advocacy: To help celebrate NDHW 2003, the Thunder Bay Dental Hygienists Society launched an aggressive public advocacy campaign to tackle what remains one of the most serious public health risks in Canada—cigarettes and second-hand smoke.

Soup-up Your Smile: Students at the University of Manitoba School of Dental Hygiene hosted their second annual "Soup-up Your Smile" campaign. This program reaches out to two inner-city locations in Winnipeg, Manitoba, providing an array of services, including free oral health screening.

Brochure for new moms: As part of the University of Manitoba School of Dental Hygiene's outreach program, a short brochure was prepared, explaining the do's and don't of prenatal and infant care concerning oral care and overall wellness.

Personal mission: When Candace Leveille of Saskatoon, Saskatchewan, decided to take a personal trip to Romania and the Ukraine, she saw it as an opportunity to "spread the good news about dental care" to another part of the world. In advance of her trip, Candace started collecting toothbrushes. "A large portion were provided courtesy of Oral-B," she notes. She handed out these toothbrushes as gifts to children she met during her travels. 🌸

"WE NEED YOUR HELP!" (continued from page 51)

on January 31, 2004. Participants included the presidents of the provincial associations, CDHA's president-elect and executive director, and representatives from the Federation of Dental Hygiene Regulatory Authorities, the National Dental Hygiene Certification Board, Dental Hygiene Educators Canada, and the Canadian Armed Forces. This gave us a good cross-section of interested parties who brought their thoughts to the table. I would like to thank all of the participants who joined me in Calgary to provide feedback and guidance to CDHA in plotting its future.

The information gathered during this interactive workshop was then used to draft new CDHA Bylaws. And this is where you, our members, come in! The draft bylaws will be posted on the CDHA web site, www.cdha.ca, so you can review and comment on them. Due to high postal costs, mailing a hard copy of the draft bylaws to each member of CDHA was not considered feasible. However, if you would like to have a hard copy, just call or e-mail the CDHA office and we will

send you one. This is an opportunity to share your opinions on the draft bylaws with us. We need members' input to ensure that the bylaws meet the members' needs, that members can work with these bylaws, and that the document is complete.

After we receive all your comments and make any necessary changes, the board will prepare the final draft for submission to the members in St. John's, Newfoundland and Labrador, in June 2004 (in conjunction with the annual conference). The membership will then vote whether or not to approve the new bylaws.

Please take a bit of time and plan to look through the draft document on the web site (Members Only section) when the document is posted—you will be notified by CDHA of its posting. Comment and ensure that your voice and opinions are heard and acted on!

Patty Wickstrom can be reached at [<president@cdha.ca>](mailto:president@cdha.ca). 🌸

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NORTHWEST TERRITORIES

FORT SMITH Fort Smith Dental Clinic is looking for a full-time dental hygienist to join our office. Offering an attractive compensation package including base salary, commissions, bonuses, and continuing education benefits, this position is well suited to a candidate with 1-2 years' experience. Please contact Mr. Hill at: tel. 1-877-424-1029; fax 780-483-6098; e-mail <hillag@shaw.ca>.

YELLOWKNIFE Land of the midnight sun and the diamond capitol of Canada! Two full-time hygienist positions available. Ultra modern clinic, integrated soft tissue management program, intra-oral cameras in private hygiene operatories, emphasis on quality perio treatment planning and care. Excellent income and working hours! Great small town with all the amenities (Wal-Mart, pool, rinks, shopping malls) and great outdoor recreation programs. Call Krista Sansom at 867-873-2775 or fax your résumé to 867-920-2775.

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ENDERBY In the North Okanagan. RDH required immediately to assume 2 day/wk in general practice. Current RDH is relocating Jan. 1/04 and is commuting to keep up 1 day/wk until a replacement is found. The current RDH is available to meet with candidates and discuss patient load. Hygiene can be expanded with patient demand. Great area to live and work in and a great team in place. Wage negotiable. Contact Dr. Sharnell Muir: tel. 250-383-6675; e-mail <drsmuir@sunwave.net>.

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Classified job ads are posted on CDHA's web site (www.cdha.ca) in the Career Centre (Members' Only section). Complimentary ads will also be published, at no cost to the advertiser, in the issue of *Probe* that follows submission of the ad. These complimentary ads should be no longer than 70 words and are inserted in the order of submission to a maximum of one page. These ads reach over 10,000 CDHA members across Canada, ensuring that your message gets to the target audience promptly. Contact CDHA for more information at 613-224-5515 or at info@cdha.ca.

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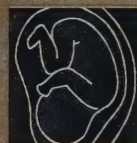
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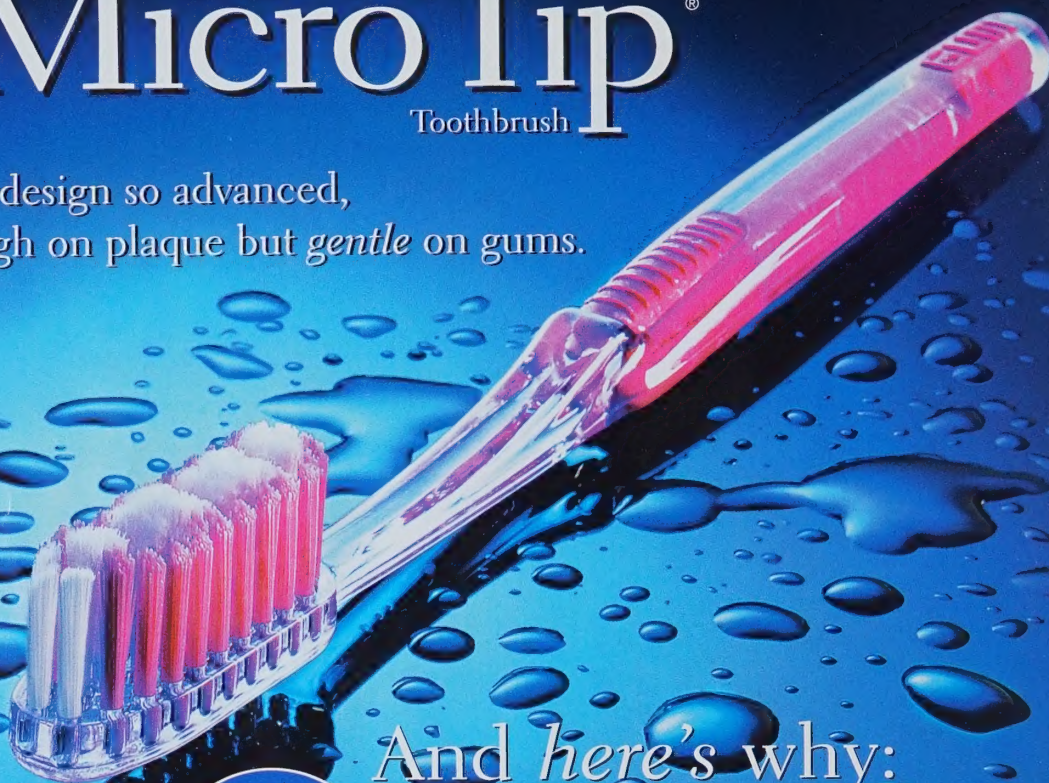
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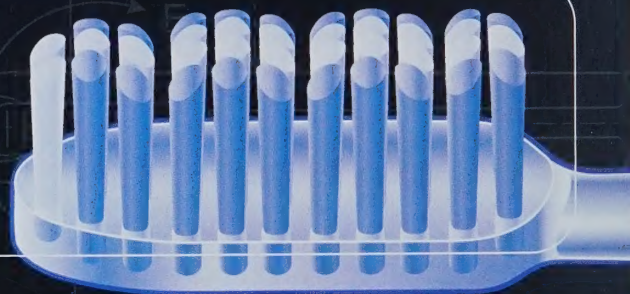
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* Reynolds, H.S. and Zambon, J.J. Microbiological and Clinical Alterations
From Using Butler "GUM" Toothbrushes. J Dent Res 76, Abstract #1753, 1997.

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HEALTHY GUMS. HEALTHY LIFE.™

Evolution

by Patty Wickstrom

The face of oral health care is changing rapidly—are we ready for it? I think so. Here are some of the areas in which we are actively involved.

Scaling modules for dental assistants

As I am sure you are aware, there has been a move to increase the scope of practice for dental assistants so they can carry out limited scaling in some jurisdictions. As I discussed in the January/February issue of *Probe*, the education and practice of a dental hygienist incorporates so much more than scaling teeth. Scaling cannot be looked upon as an isolated act. CDHA continues its efforts to educate health and dental care providers about the benefits of a well-educated dental hygienist providing the full range of oral hygiene care, one element of which is scaling.

Aging population

With public awareness, education, and, in many cases early diagnosis of and intervention for dental disease, more people are retaining their dentition longer. With that comes more long-term maintenance and further disease prevention, a key area in which dental hygienists are invaluable. Periodontal disease remains a very considerable threat to the long-term health of a person's oral cavity.

**The need to educate the public
and gain their support for
unrestricted access to dental hygiene
services for all people of Canada.**

Evidence-based practice

Along with the changes in oral health, the profession has a responsibility to remain current and anticipate dental hygiene services for the future. Salme Lavigne and Judy Lux have gathered and interpreted data concerning the links between oral health and general health—their paper is included in this edition of *Probe*. I encourage you to read this article and incorporate the information into practice. You are welcome to give your feedback and comments to the CDHA office. As we continue our move toward evidence-based practice, we need more research and data to support



Évolution

par Patty Wickstrom

Le panorama des soins bucco-dentaires change rapidement — sommes-nous prêtes à affronter ce changement ? Je le crois, et voici quelques-uns des domaines dans lesquels nous sommes engagées.

**La nécessité d'éduquer le public
et d'obtenir son appui pour travailler
à assurer un libre accès aux
services d'hygiène dentaire pour
tous les habitants au Canada.**

Modules de détartrage pour les assistantes dentaires

Vous savez, j'en suis sûre, qu'on a progressé pour élargir la portée de la pratique des assistantes dentaires afin de leur permettre d'effectuer un détartrage limité, dans certaines provinces. Comme j'en ai discuté dans le numéro de janvier/février de *Probe*, l'éducation et la pratique de l'hygiéniste dentaire intègrent tellement plus d'éléments que le détartrage des dents. On ne peut considérer le détartrage comme un acte isolé. L'ACHD poursuit ses efforts pour éduquer les dispensateurs de soins de santé et de soins dentaires relativement aux bénéfices d'une hygiéniste dentaire diplômée qui dispense la gamme complète des soins d'hygiène bucco-dentaire, dont le détartrage constitue un des éléments.

Vieillesse de la population

Davantage de personnes conservent leur dentition plus longtemps, suite à la sensibilisation du public, de l'éducation et, dans bien des cas, du diagnostic précoce d'une maladie dentaire et de l'intervention conséquente qui s'ensuit. Ce qui entraîne un entretien à plus long terme et une meilleure prévention de la maladie, domaine clé dans lequel les hygiénistes dentaires rendent des services inestimables. La parodontopathie demeure une menace très grave à la santé à long terme de la cavité buccale d'une personne.

Pratique fondée sur des données probantes

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1. Volpe AR, et al. J Clin Dent. 1996; 7 (suppl): S1-S14. 2. Data on file, Colgate-Palmolive Company. 3. Ayad f, et al. Clinical efficacy of a new tooth whitening dentifrice. J Clin Dent. 2002; 13:82-85. 4. Singh S, et al. The clinical efficacy of a new tooth whitening dentifrice formulation: A six-month study in adults. J Clin Dent. 2002; 13:86-90.

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MESSAGE DE LA DIRECTRICE GÉNÉRALE

Not just a collection of parts...

by Susan Ziebarth,
BSc, MHA, CHE



Beaucoup plus que la somme des parties...

par Susan Ziebarth,
BSc, MHA, CHE

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The cleaning lady deals with the patient on a human level. She's scrubbing the floor in the room and the patient says, "My son didn't come to visit me today." The cleaning lady smiles and says, "I know how you feel. I know how I'd feel if my son didn't come to visit me if I was sick." The cleaning lady doesn't see the patient as a renal failure or an ileostomy. She just sees a poor lady who's sick.

— Kitty Scanlan, U.S. occupational therapist, as quoted in *Working*, Book 8, by Studs Terkel (1973)

The two feature articles in this issue of *Probe* seem unrelated at first glance. One explores the literature on the linkage between oral health and overall health; the other is an interview with Pat Spencer who has worked collaboratively with other health professionals to enhance clients' oral and general health for close to 40 years. However, the connection between these two articles—and the new and exciting possibilities they hold—came strongly to mind when I attended a National Stakeholders' Workshop on Interprofessional Education for Collaborative Patient-centred Practice. The premise for this workshop is captured in the above quotation, that people are more than a collection of body parts or diseases.

People are more than a collection of body parts or diseases.

Health care and access to it for all Canadians have been in the forefront of the news for a few years now, thanks to the work of the Romanow and Kirby commissions. Based on these commissions' findings, the First Ministers' Health Accord on Health Care Renewal in 2003 has stressed the need for Canadians to have access to health care providers, both now and in the future. One result is the National Health

La femme de ménage traite avec la patiente à un niveau humain. Elle frotte le plancher de la chambre et la patiente lui dit : « Mon fils n'est pas venu me voir aujourd'hui ». La femme de ménage sourit et dit : « Je sais ce que vous ressentez. Je sais ce que je ressentirais si j'étais malade, si mon fils n'était pas venu me voir ». La femme de ménage ne voit pas la patiente comme une insuffisance rénale ou une iléostomie. Elle ne voit qu'une pauvre femme malade.

— Kitty Scanlan, ergothérapeute américaine, telle que citée dans *Working*, Book 8, par Studs Terkel (1973)

La personne humaine représente davantage que la somme des parties du corps ou des maladies.

Àu premier coup d'œil, les deux articles de fond de ce numéro de *Probe* ne semblent pas avoir de rapports l'un avec l'autre. L'un explore la documentation sur le lien existant entre la santé bucco-dentaire et la santé en général; et l'autre est une entrevue avec Pat Spencer qui a travaillé pendant une quarantaine d'années, en collaboration avec d'autres professionnels de la santé, à l'amélioration de la santé bucco-dentaire et de la santé en général. Toutefois, la connexion entre ces deux articles, — et les nouvelles possibilités excitantes qu'ils renferment —, me sont sautées à l'esprit avec force alors que j'assistais à un atelier national des intervenants sur l'éducation interprofessionnelle en vue d'une pratique centrée sur le patient. La prémisse de cet atelier est captée dans la citation ci-dessus, soit que la personne humaine représente davantage que la somme des parties du corps ou des maladies.

NOT JUST A COLLECTION OF PARTS ...continued on page 139

BEAUCOUP PLUS QUE LA SOMME DES PARTIES ...suite page 139

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1. Sharma, N.C. et al, Comparative effectiveness of an essential oil mouthrinse and dental floss in controlling interproximal gingivitis and plaque. American Journal of Dentistry 2002.

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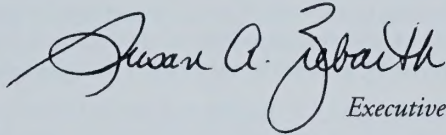
NOTICE is hereby given that the special meeting of the members of CANADIAN DENTAL HYGIENISTS ASSOCIATION will be held at the Fairmont Newfoundland, at 115 Cavendish Square, St. John's, Newfoundland and Labrador, on Sunday the 27th day of June, 2004, at the hour of 8:00 o'clock in the forenoon, to:

- I. Consider for ratification the amendments to the corporate bylaws.

Copies of the proposed amended bylaws are available for review at the corporation's head office during normal business hours and on-line at www.cdha.ca/members/content/policy&action/proposed_bylaw_revisions.asp

DATED the 15th day of May, 2004.

BY THE ORDER OF THE BOARD OF DIRECTORS


Executive Director

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Avis

AVIS DE CONVOCATION DE L'ASSEMBLÉE EXTRAORDINAIRE DES MEMBRES DE L'ASSOCIATION CANADIENNE DES HYGIÉNISTES DENTAIRES (ACHD)

Les membres de L'ASSOCIATION CANADIENNE DES HYGIÉNISTES DENTAIRES sont par le présent AVIS convoqués à une assemblée extraordinaire qui aura lieu au Fairmont Newfoundland situé au 115, Cavendish Square, à St. John's (Terre-Neuve-et-Labrador) le dimanche 27 juin 2004, à huit heures. À l'ordre du jour :

- I. L'examen des modifications des règlements de l'Association aux fins de ratification.

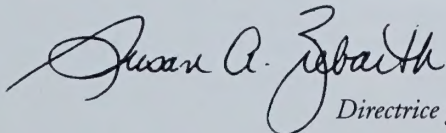
Les règlements modifiés qui sont proposés peuvent être examinés au siège social de l'Association pendant les heures de bureau ou en ligne à l'adresse suivante

www.achd.ca/content/~fr_salle_des_nouvelles/proposed_bylaw_revisions_fr.asp

Des exemplaires des états financiers et du rapport des vérificateurs peuvent être examinés au siège social de l'Association pendant les heures d'affaires ordinaires.

FAIT le 15 mai 2004.

PAR DÉCRET DU CONSEIL D'ADMINISTRATION


Directrice générale

PRESS RELEASE

Announcing the First-Ever Listerine Gingivitis Week

*Three out of four Canadians have gingivitis
– BUT only 6% know it*

TORONTO, ON, April, 2004 – Today, Pfizer Canada and the Canadian Dental Hygienists Association (CDHA) are proud to announce their partnership for the first-ever **Listerine Gingivitis Week**, to take place this June 7–13, 2004. Seventy-five per cent of Canadians have gingivitis—the earliest and mildest stage of gum disease—yet only six per cent of us believe we are personally affected by this condition. The goal of Gingivitis Week is to educate Canadians on the personal relevancy of this condition and prompt patients to talk to their dental hygienists.

The first step to eliminating gingivitis—the precursor to periodontal disease—is making patients aware of the condition, their options, and available solutions.

“Contrary to popular belief, bleeding, red gums are not normal,” says Susan Ziebarth, Executive Director of the Canadian Dental Hygienists Association. “It’s an odd perception, as bleeding from other parts of the body such as the nose or ear, would naturally be a cause for concern. Yet red, puffy, or bleeding gums—which are a warning sign for gingivitis—seem to be readily accepted by Canadians. Our hope is Listerine Gingivitis Week will shed some light on gingivitis as a condition, starting with its symptoms and potential health implications. But most importantly, we want to encourage a dialogue between patients and their dental hygienists.”

The week will be launched nationally on Monday, June 7, in Toronto at a special kick-off event. A mix of interactive education and awareness activities are planned, including on-site sampling, prizes, and charitable contributions. Events have also been planned for Vancouver (Wednesday, June 9) and Montreal (Friday, June 11).

For more information, please contact:
Amy Stork/Sarah Lewis

Environics Communications
416-969-2737/416-969-2759

astork@environicspr.com / slewis@environicspr.com

New edition of *Clinical Practice of the Dental Hygienist*, by Esther Wilkins

This definitive text on dental hygiene has been significantly revised and updated. The ninth edition, published by Lippincott Williams & Wilkins, will be available in June 2004. The publisher’s web site states that this edition provides “even more focused guidance on all aspects of dental hygiene in the clinical environment.... Six comprehensive sections address orientation, preparation for appointments, patient assessment, treatment, and patients with special needs. New features include a significantly revised art program, case-based exercises to reinforce understanding, procedure boxes to enhance technique, and ethics boxes. New ancillaries include a study guide (sold separately) and instructor’s Website.”

New Health Professional’s Guide to Pediatric Oral Health Management

This new guide, prepared by the U.S. Maternal and Child Health Bureau, contains “seven self-contained online modules designed to assist health professionals in managing the oral health of infants and young children.” The modules provide information on “performing an oral screening to identify infants and children at increased risk for oral health problems, offering referrals to oral health professionals, and providing parents with anticipatory guidance.” The guide can be viewed at <www.mchoralhealth.org/PediatricOH/index.htm>.

Federal government enhances the Education Tax Credit in response to CDHA request

CDHA members requested that we lobby the federal government to obtain tax credits for continuing education expenses. Since CDHA firmly believes in “strength in numbers,” we assembled a group of six like-minded organizations, including the Canadian Nurses Association and the Canadian Counselling Association. As a result of our combined efforts, the latest federal budget announced that employed individuals can now claim the education tax credit for education related to current employment when costs are not reimbursed by employers. This will give dental hygienists a tax credit amount of \$400 per month for full-time students and \$120 per month for part-time students.

The Canadian Dental Hygienists Association Celebrates Federal Government Investment in Public Health

March 24, 2004, Ottawa: The Canadian Dental Hygienists Association (CDHA) gives a hopeful thumbs up to the federal budget. The creation of a new position—Secretary of State (Public Health)—\$1 billion for public health and the new Canadian Public Health Agency are significant positive steps forward.

There is abundant evidence that a sizeable portion of the population does not have access to oral health services. In addition, in the last 24 years, the numbers of dental hygienists working in public health have decreased threefold from 13% in 1977 to 3.8% by 2001. Susan Ziebarth, Executive Director of CDHA, says, "Canada needs to do a better job addressing the inequalities in oral health and improving access to oral health care. Some of this public health money must be directed to an oral health safety net."

The Canadian Dental Hygienists Association calls for a Canadian oral health strategy that monitors oral health status and gives direction to new oral health programs. There is a particularly pressing need for oral health programs for seniors in long-term care facilities, low-income families, and Aboriginal peoples both on- and off-reserve.

There is now a large body of evidence indicating a possible link between periodontal disease and systemic diseases, such as diabetes, heart and lung disease, and pre-term low birth weight babies. Given these new connections, there is a key role for dental hygienists to play in decreasing the incidence and severity of these systemic diseases and also a stronger argument for an oral health system that is accessible to all. The mouth-body connection also highlights the need for collaborative work between oral health professionals and general health professionals, and public health is the logical place for this collaboration to begin.

For more information, please contact:

Judy Lux

Health Policy Communications Specialist

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CDHA Board – Highlights of Meeting

February 2004, Ottawa – The CDHA Board of Directors welcomed many new board members and received orientation by Jannice Moore. The new provincial representatives are Susan Vogt (SDHA), Carol Yakiwchuk (MDHA), Evie Jesin (ODHA), Alison MacDougall (PEIDHA), and Palmer Nelson (NLDHA). Bonnie Blank began her term as the DHEC representative.

The Ends were reconfirmed using information gathered from the Board members, as representatives of the CDHA members. The Board, with the coaching of Jannice Moore, also reviewed and amended the policies on Governance, Executive Limitations, and Board–Executive Director Linkage. (The complete Mission/Purpose Ends Statement can be viewed on-line at www.cdha.ca, *Members Only* section, *CDHA Priorities* area, under Inside CDHA.)

Karen Wolf will chair the Town Hall Organization Committee for the conference in St. John's, Newfoundland and Labrador. Palmer Nelson, Evie Jesin, Carol Yakiwchuk, and Bonnie Blank will round out the committee. The committee's mandate is to plan the Town Hall Meeting for June 2004, guided by Governance Process Policy, and to brainstorm for ownership linkage ideas for the upcoming year.

The Board agreed to extend the term of office for the next two presidential terms in order to bring this term of office in line with the board of directors' terms so that they will align by October 2006.

Post-meeting news: Early in March, Lynn Smith was elected to the position of CDHA Director for the British Columbia Dental Hygienists' Association for the 2004–2007 term.



The Dental Hygienist and Access to Care:

Interview with Pat Spencer, DipDH, BA

by Dennis Jones



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When Pat Spencer received her dental hygienist's diploma in 1966, she was one of a relatively small number of dental hygienists—fewer than 300—who were practising in Ontario. Since then, the dynamic Ms. Spencer has acquired a BA, served as the sole oral-care participant in the advisory group for the provincially sponsored Elder Abuse Initiative, served as President of the Ontario Dental Hygienists' Association and as a member of its executive, instructed in dental hygiene and management subjects at the local campus of Fanshawe Community College, and has lobbied her local MPP, government committees and numerous organizations to gain support for amending dental hygiene legislation.

As an entrepreneur, Ms. Spencer established her own practice, Mobile Oral Health Services, in 1996. Through her business, she provided mobile dental hygiene care to residents in several long-term care facilities and to the homebound who cannot obtain access to traditional office settings. Her experience in dealing with these clients and their families has made her especially sensitive to the problems they experience in obtaining adequate oral health care.

We talked with Ms. Spencer about her long career and about the ways in which she believes her profession can help improve Canadians' access to dental hygiene services.

Q: You've been a dental hygiene professional since 1966. Can you tell us something about the influences that led you to enter the profession?

The thing that helped lead me in that direction, I think, goes right back to when I was seven or eight years old and needed to have a dentist remove teeth to alleviate crowding. I thought this was quite something, so I guess I had an interest in oral health right from the time I was a child.

But in the early 1960s, when I was thinking about a profession, nobody knew about dental hygienists. I don't think that high school guidance counsellors, for example, were even aware of the possibility of dental hygiene as a career. At that time, most young women who wanted a profession were advised to go into nursing or teaching.

However, I knew I didn't want to be either a nurse or a teacher. I considered training as a dental technician, but was told by a lab that no one would take me on as an apprentice—they believed that women usually got married and then stayed home, so the training would be wasted. However, the president of the dental technicians' association, to whom I had written, advised me to look into the dental hygiene program at the University of Toronto. I was accepted into the program in January 1964 for a fall start, and I received my diploma in May 1966.

Q: How did the University of Toronto go about training dental hygienists in the 1960s? And how was it different from today's approach?

From the time we entered the University of Toronto, we were fully involved in the university program. The emphasis was on training us to be well-rounded, responsible professionals, so we had classes with a wide range of other students—pre-med students, physiotherapy and occupational therapy students, sociology majors and so on. In that way especially, it was very good preparation for the work world.

Later on, of course, dental hygiene programs were shifted from the universities into the community college system. When that happened, these programs stopped being a direct entry into the profession. You first had to train as a dental assistant in a community college, then work in this capacity, and only after that could you reapply to train as a full-fledged dental hygienist.

What they needed most was someone like me to come in and show the caregivers how to provide dental care for her.

In my opinion, which is based on information I acquired in my cultural studies program, this approach socialized dental hygienists to be dependants of the dentist rather than full professionals in their own right. Now, however, with the change back to a direct-entry program in the community colleges and in private dental hygiene schools, that socialization pressure has fortunately been removed.

Q: Tell us about your first job, when you were employed by the city of Hamilton.

There was a part-time dentist I reported to, and I reported directly to the city's Medical Officer of Health as well. At that time, I was the only dental hygienist employed by the city, and I was responsible for visiting schools, providing oral health education, screening for oral diseases, and making reports on what I found out about the oral health of the children. The data from these surveys formed part of the research for the World Health Organization, which was comparing children's oral health in cities of a similar size among various countries. Another major part of my role was to be an oral health resource for the community. I was very comfortable with my position in this work world because the education I'd received was so well-rounded.

Q: What directions did your career take after that?

Because I was one of the early dental hygienists, dentists would hire me to set up the dental hygiene practices they needed for their offices. Also, like many of my classmates, I took several years off for childrearing but worked as dental hygienist for the majority of my working years. Eventually, I became an entrepreneur and established my own dental hygiene practice.

Q: You've indicated that you started your independent practice because you were concerned about access to care in institutional settings. What situations did you encounter that led you to concentrate on this problem?

I'd realized that large numbers of seniors had an acute need for preventive oral health services, and that a similar need existed among the homebound and among people who couldn't afford or get access to the kind of oral care delivered in traditional dental offices.

Families would complain to me that they couldn't get help for their loved ones. One particular lady was in home care, with her family providing round-the-clock caregivers, but she was unable to get access to a dental office. What they needed most was someone like me to come in and show the caregivers how to provide dental care for her.

There were lots of other situations that made me realize how great the need was. People with broken hips, for example, have great difficulty sitting in a chair and often need to be treated in their beds. People with advanced dementia and people with Parkinson disease are other instances. I chose to focus on the elderly population who were institutionalized or homebound, but people don't have to be older to need help, of course. Individuals who are developmentally compromised can have severe difficulties, as well.

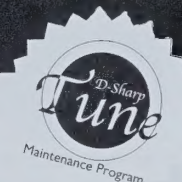
Q: Preventive care is clearly a good strategy for averting serious oral health problems. How does this strategy fit into your vision of better access to care?

There's no end of examples that show the need for preventive care. One man I treated had his infected first molar extracted by a priest while hiding from the enemy during the war, when he was about seven years old. As a result, he was terrified of dental care. By the time I saw him, he was at the point where he would lose his job if he didn't have oral care to deal with the bad mouth odour. I worked with him to clean up the periodontal problems and watched as his self-esteem and his health slowly came back. Over and over, you see people come in with problems, and as their oral health disorders clear up, their poise and confidence returns.

It's hard to quantify the benefits of any kind of preventive program. However, you can go into opportunity costs, and there have been studies in the United States on this, such as how many work hours are lost to oral health problems. Unfortunately, there isn't a lot of Canadian literature on the subject yet. But the Federal, Provincial and Territorial Dental Directors Working Group is now working on a project called the National Oral Health Strategy, which will eventually provide a database of information about the status of oral health in this country and will establish a set of strategies and goals toward which we can work. I've provided input from my own research toward this project.

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With regard to background, continuing education is extremely valuable to any practitioner.

Dental hygienists will certainly have a large part to play in preventive oral health strategies, whatever these strategies turn out to be. We provide more than half of oral health services billed, according to reports, and our delivery of these services is extremely flexible and portable.

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Q: You established your independent dental hygiene practice in 1996. Could you describe the regulatory changes in Ontario that allowed you to do this?

The key regulatory change was when the Dental Hygiene Act went into force in December 1993. The Act recognized dental hygiene as being separate and distinct from dentistry. After it was proclaimed, dental hygienists were able to practise in the community without needing the presence of a dentist.

DALHOUSIE UNIVERSITY

FULL-TIME POSITION AVAILABLE

School of Dental Hygiene



The Faculty of Dentistry, Dalhousie University, Halifax, Nova Scotia, is seeking applications for a full-time, limited term, possibly leading to tenure track, position in the School of Dental Hygiene commencing July 1, 2004. The two-year limited term will be fully credited to the time frame of the probationary tenure track position, if granted. The position requires a minimum Masters degree, teaching and practice experience and evidence of scholarly activity. Preference will be given to candidates with a PhD. Academic rank and salary will be based on the successful candidate's qualifications, experience and achievements. It is expected that the successful applicant will have demonstrated experience in teaching and administration of dental hygiene courses, clinical teaching and scholarly activity and be eligible for licensure in Nova Scotia as a dental hygienist. If eligible for licensure in Nova Scotia, there will be an opportunity for one day per week of private practice.

All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. Dalhousie University is an Employment Equity/Affirmative Action employer. The University encourages applications from qualified Aboriginal people, persons with a disability and racially visible persons. Applications will be received until May 31, 2004 or when the position is filled.

Dalhousie University is one of Canada's leading teaching and research universities, with four professional Faculties, a Faculty of Graduate Studies and a diverse complement of graduate programs. Collaborative and interactive research is encouraged, as is cooperation in teaching among the Faculties. We inspire students, faculty, staff and graduates to make significant contributions to our region, Canada, and the world. Dalhousie is located in Halifax, Nova Scotia, a vibrant capital city and the business, academic and medical centre for Canada's east coast.

Applicants should submit a letter of application with Curriculum Vitae and two or three reprints of any research publications and the names, addresses and internet addresses of three references to:

Dr. H. A. Ryding, Chair, Search Committees, Faculty of Dentistry
DALHOUSIE UNIVERSITY, Halifax, Nova Scotia, Canada B3H 3J5
Telephone: (902) 494-6886 Fax: (902) 494-2527

Under this legislation, however, dental hygienists require an order from a member of the Royal College of Dental Surgeons of Ontario in order to perform the controlled acts of scaling and of restorative and orthodontic services in the community. While this is understandable for restorative and orthodontic services, it is unnecessary for preventive scaling services. Dental hygienists know when to refer and when to proceed with the provision of scaling services; unfortunately, this need for an order for scaling means that the public needs a dentist of record to provide the order.

Unfortunately, some members of the public cannot afford this because they have no dental benefits and a low income; others cannot obtain access to a dental office because of distance, transportation problems or illness; and others simply choose to avoid the intervention of a dentist. As a result, the public is denied ready access to the cost-effective options in preventive oral care that mobile and flexible dental hygienists can provide.

Q: What kind of qualifications and background contribute to setting up a successful dental hygiene practice?

To begin with, obviously, you have to meet the requirements of being registered to practise in Ontario. It's also very wise to think as a business person and to meet business standards and practices by using proper accounting and record-keeping procedures, by marketing your services effectively, by purchasing commercial liability insurance, and so on. As an aside, I have found that the best insurance rate is available through our professional associations.

With regard to background, continuing education is extremely valuable to any practitioner. On the clinical side, some obvious educational choices are studies in dementia and palliative care. But I've found that what really prepared me for running my own business was having gone through a liberal arts degree program. For example, by studying environmental law, I learned how to read legislation and about the ways legislation can be amended. Cultural studies helped me appreciate that different cultures have different approaches, so I learned to be much more sensitive to differences. Education in counselling is also excellent—I did a counselling program that significantly changed how I thought and how I approached people.

Q: In your experience, what are the advantages of being self-employed? And how do you ensure a balance between work and personal life?

The great advantage of being self-employed was being my own boss—I could choose my working hours and how I spent them. When I was employed by someone else, I'd have only so much time with a client and would be expected to generate a specific amount of income during that time. But when I was in charge, I could choose how to manage things. Some people wanted me to help with dietary analysis, some with smoking cessation. Or they just wanted counselling and information, and counselling is very much a part of being a dental hygienist.

As for maintaining a balance, it's important to realize that no one will be as concerned about your health, your family, and your financial planning as you are, so you have to make time to address these needs. Small-business owners frequently find that the business will gobble up any time that is not scheduled. Consequently, you must be sure that you make regular "appointments" for dealing with personal needs.

Q: Can there be a frustrating side to running an independent dental hygiene practice?

There can be. If I could have provided scaling services without needing an order, I probably wouldn't have felt quite so frustrated. I was offering a package of preventive oral services—screening for oral disease and swallowing disorders, developing oral protocols, giving referrals, providing in-service training, and so on. But because the Dental Hygiene Act required me to have an order from a dentist to provide scaling services, and because many of my clients didn't have a dentist of record or couldn't afford a dentist, I wasn't completely free to offer all the services I could provide. In other words, I was restricted from providing my full scope of practice, and this created some frustration.

Q: Turning again to education, you've pursued learning throughout your career. In the context of your profession, why is continuing education so important?

Because clients rely on dental hygienists as a source of accurate information, continuing education is necessary to better understand the client, to know the best approach to an oral health problem, and to have the most accurate and current data about available options. Continuing education also increases your professional credibility and offers more career paths, including obtaining a PhD in dental hygiene.

And as I've already suggested, continuing education is important if you decide to set up an independent dental hygiene practice. There's a lot to learn about organizational behaviour, marketing, customer relations, taxation, and accounting.

Q: In your experience, which segments of the Canadian population most need better access to oral health care? How can we provide this care?

More and more individuals are losing dental benefits because they're working on contract. Older adults are retaining more of their natural dentition but have limited income. Young people are looking longer for their first permanent job and their income is also limited. Also, there are many who are frail or medically compromised and who need continuing care but who cannot afford or get access to a traditional dental office.

As a result, there's a growing need for cost-effective alternatives in oral-care delivery. One approach for a dental hygienist might be to share an office with other health care providers, such as a denturist, chiropractor, or physiotherapist, with a 60/40 income split—you keep 60 per cent of your income and allocate 40 per cent of it to overhead and administration costs. Then, depending on your community and your overhead, you can choose how much revenue you need to earn and where and for whom you'd provide care. As another possibility, you might work with a group of dental hygienists and share the hours as it suits the members of your group.

Q: What do you think will happen if we don't find viable, cost-effective ways of providing oral health care for people who need it?

If we don't, the situation will only get worse. Right now, there is a terrible disparity between the haves and the have-nots. Eventually, it will be a very tiny minority who can afford oral health care if these alternatives are not provided—especially as more and more jobs become low-paying ones or turn into contract positions with no benefits. I think it's going to be a major issue; my particular topic of research right now is globalization, simply because I think that within 20 years we're going to be very vulnerable in this area.

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There's a growing need for cost-effective alternatives in oral-care delivery.

Q: What measures could institutions, governments, and the oral health care professions take to provide Canadians with the oral health care they need?

First, if primary care reform included the dental hygienist as a provider recognized by Medicare, many institutionalized people could have regular preventive care. Second, removing the need for an order for scaling would give dental hygienists opportunities for providing preventive services in remote communities, through health units or community centres. Third, other professions and the public need to understand the importance and role of good oral care to overall health.

Dental hygienists can help promote such measures. The Canadian Medical Association, for example, is lobbying to raise awareness of the financial and legislative challenges that medical professionals face. Dental hygienists also have to recognize that, just as they take personal responsibility for their lives and their personal futures, they must also take responsibility for their profession and use the political process to secure its advancement and its future.

Q: From your perspective, what concrete steps can your profession take to meet Canadians' oral health care needs?

I think that dental hygienists could adopt a nursing home and make their services available once a month or every six months, as the need arises. We can also examine partnering with other health practitioners, for example, by providing a team approach to holistic care. In this sort of care, the dental hygienist is one of several professionals, a team of people who look at the whole person and help him or her gain the optimum quality of life. However, a team wouldn't be made up exclusively of health care professionals; it would include other specialists such as social workers. Each team member would learn what the others' strengths were, so they could refer clients to each other according to the client's needs.

Q: You've mentioned that the provision of counselling and information is a very important part of dental hygiene services. How can dental hygienists best help people obtain the information they need and want?

We can develop partnerships to make oral health care information more accessible. One way to do this is through health fairs. Health fairs inform people about what may be available to them through organizations such as the Department of Veterans Affairs, their local Alzheimer Association, the Diabetes Association and so on. As other examples, we can take courses with other health care practitioners and share our knowledge with them, and we can offer ourselves as resources to those associations that support people whose ill health puts them in need.

Getting our clients into educational situations is important. When I graduated, it was assumed that when you, a member of the public, had a health problem, you'd go to a professional who would then own the problem. Now, the emphasis is on people being responsible for their own health care, so they need access to teams of professionals who can give them the information they need to take charge of their health. In these educational situations, it's important to use language that's familiar to the public—and to other kinds of health care providers—and not lapse into dental jargon.

Q: Given what you've just said, do you feel that your profession might be wise to evolve a larger counselling and educational role that would complement its clinical role? And if so, how could this be done?

More and more individuals are losing dental benefits because they're working on contract.

Because of their education, dental hygienists already have an excellent basis for providing oral health information, but we need better opportunities to offer this service. Dental appointments are scheduled to provide the scaling services that generate the most income for the dental office, and the limited time available for each appointment makes it hard for the dental hygienist and the client to fully discuss the client's oral health.

Self-employment, on the other hand, allows dental hygienists to schedule the amount of time the client needs. You don't use a one-size-fits-all approach—you might have a child coming in for the first time, so you'd do everything very gradually. Or you could have someone who was very fearful of oral health care, and you'd adapt your approach to alleviate their anxiety. If you were treating somebody who was tube-fed, you'd go in when the principal caregiver was there because that would provide a much more supportive environment for your client.

Q: How do you see your profession's future in dealing with the access-to-care problem, and what advice do you have for dental hygienists who want to be part of the solution?

Dental hygienists can screen clients who need care and can make appropriate referrals. They can also provide information on the options that are available in health, nutrition, smoking cessation, personal care and so on. More education will open up more possibilities.

Dental hygienists can also explore the alternative delivery settings and multidisciplinary approaches I mentioned earlier and look for opportunities to help the public gain access to preventive oral care services. Building bridges with other organizations, professions, and providers is also essential.

The focus in dental practices has long been on the dental hygienist's scaling services, but the possibilities for dental hygienists as health care providers are in fact unlimited. The negative impacts of a globalized economy will dramatically increase the need for affordable and safe alternatives in oral care, and the effective and increased use of dental hygienists will be a major contributor to those alternatives.

Q: As you look back on your long career, could you tell us what things about it have given you the most pride and satisfaction?

It's a combination of things. I'm really proud of the fact that every dental hygiene practice I set up grew and thrived, and that preventive oral health care from dental hygienists is now regarded as the industry standard by the public. I'm proud that I had a chance to serve my provincial association on the Board of Directors, including a term as president, and that I took advantage of legislative changes to make my mobile dental hygiene practice a reality. And finally, I'm very proud to have known wonderful mentors and pioneers such as the late Barbara Heisterman and my many other colleagues across Canada, and that I chose to become a dental hygienist way back in 1964. 

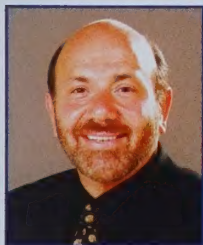


Dentin Hypersensitivity

Managing and Treating

Canadian Advisory Board on Dentin Hypersensitivity

The high prevalence of dentin hypersensitivity, combined with continued underreporting and underdiagnosis, has intensified the need to focus on the management of this condition. Responding to that need, the Canadian Advisory Board on Dentin Hypersensitivity, a committee representing a broad range of dental care specialties, convened to determine best-practice recommendations.¹ Collectively, they evaluated the scientific evidence as well as condition-related knowledge gaps that were identified by an extensive national survey of 8,000 dental professionals (7% response rate). By contributing their own diverse expertise, the committee produced the first ever "Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity," to provide direction to the dental care profession.



Barry Dolman, DMD

Management begins with removal of predisposing factors

Evidence suggests erosion is the most significant factor in the loss of tooth enamel and a key predisposition for the development of dentin hypersensitivity. Dietary acids from foods and beverages, such as citrus fruits and juices, wines and carbonated drinks are recognized as risk factors for erosion, as they play a critical role in the "softening" of enamel. While normal enamel is resistant to various stresses, such as



K. Tony S. Gill, DMD

toothbrushing with or without toothpaste, "softened" enamel becomes increasingly susceptible to physical forces such as abrasion, attrition or even abfraction.

Regardless of the predisposing factors and forces implicated in each patient's dentin hypersensitivity, once diagnosed, management must begin with the removal of the factors that "soften" enamel. For many patients, changing dietary habits, oral hygiene or tooth grinding behaviour is difficult and presents a professional challenge when treating dentin hypersensitivity. While behaviour modification is critical to controlling exacerbation of the condition, the removal of risk factors alone may not be totally effective. Treating the pain may be the only recourse.

First-line treatment should be non-invasive and reversible

Available first-line treatments for dentin hypersensitivity are generally designed to reduce fluid flow in dentin tubules or block the nerve response in the pulp. Most treatments interrupt neural activation and pain transmission with potassium nitrate or potassium chloride, but there are also a variety of physical and chemical agents that reduce fluid flow by occluding the tubules themselves. Strontium chloride is an example of such an occluding agent. While procedures like mucogingival surgery, pulpectomy or the use of resins present viable treatment options, they are invasive and irreversible, and should be reserved for severe cases. With comfort, convenience and cost in mind, non-invasive and reversible alternatives should be recommended first to any patient experiencing dentin hypersensitivity.

The most convenient non-invasive and reversible treatment is one that can be initiated by patients at home.

The most convenient non-invasive and reversible treatment is one that can be initiated by patients at home, as part of their existing oral hygiene routine. Experience demonstrates that desensitizing toothpaste provides improvement for a majority of cases. As a result, the Consensus Report recognizes desensitizing toothpaste as an efficacious, inexpensive and non-invasive first-line treatment for preventing the pain of dentin hypersensitivity. It also notes that ongoing use of desensitizing toothpaste need not sacrifice cavity prevention, whitening, or other benefits that many patients seek in their regular toothpastes. The Consensus Recommendations do emphasize, however, that for best results, desensitizing toothpaste should be used properly. Considering the natural outward flow of fluid from the pulp toward the outer surface of dentin,² it is important to ensure that the right amount of active ingredient is applied, and over time, accumulates to build a protective barrier. Twice-daily brushing maintains the barrier, and prevents pain from coming back.

(There is no published evidence to support topical application or "dabbing.") Dental care professionals need to instruct the patient before initiating treatment. An ongoing regimen of regular, twice-daily brushing is the only clinically supported method of application.

Follow-up helps achieve treatment success

Many patients use desensitizing toothpaste only when they feel tooth pain. Once the pain disappears, they return to their regular toothpaste until the next painful bout. If pain abates with treatment but recurs following treatment cessation, it may be an indication that the patient's condition requires ongoing attention. Patients need to be instructed about the need for long-term treatment in such cases. Unless properly educated about their condition and its treatment, they may think treatment has been unsuccessful in preventing pain and mistakenly stop it altogether.

The need to follow up with those diagnosed with dentin hypersensitivity cannot be overstated. Only diligent care including pain prevention combined with long-term management will successfully treat the ongoing discomfort and ultimately help sufferers stay pain-free.

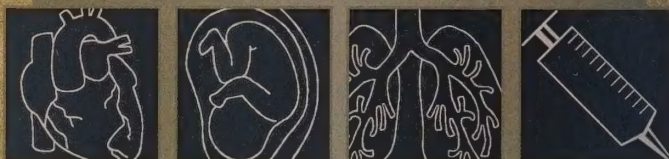
The Canadian Advisory Board on Dentin Hypersensitivity was supported by an unrestricted educational grant from GlaxoSmithKline Consumer Healthcare.



1. Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity. Canadian Advisory Board on Dentin Hypersensitivity. *J Can Dent Assoc* 2003;69(4):221-226.
2. Jain P, Vargas MA et al. Dentin desensitizing agents: SEM and X-ray microanalysis assessment. *Am J Dent* 1997;10:21-27.

Your Mouth

— Portal to Your Body



by Judy A. Lux, BA, MSW, and
Salme E. Lavigne, RDH, BA, MS(DH)

Canadian Dental Hygienists Association Position Paper on the Links between Oral Health and General Health: Part I

This paper discusses four aspects of systemic health and their association with periodontal disease. Two diseases, diabetes mellitus and heart disease, are examined in this issue of Probe. The last two sections of the paper, respiratory disease and preterm low birth weight infants, will appear in the July/August 2004 issue of Probe.

EXECUTIVE SUMMARY

A large body of research indicates a striking association between oral health and systemic health. Heart disease, preterm low birth weight babies, diabetes mellitus, and respiratory disease are being linked to periodontitis.

- Periodontal disease may exacerbate diabetes mellitus. Mechanical periodontal therapy combined with systemic antibiotics may provide better metabolic control of type 2 diabetes, with a 0.8% to 11% reduction in glycated hemoglobin.
- Persons with periodontal disease have a 1.04 to 2.8 fold greater risk of incurring cardiovascular disease than persons without periodontal disease. Of the different types of cardiovascular disease, stroke shows the most robust association.
- Women with periodontal disease may have 4 to 7.9 times the risk of having a preterm birth than do women with good oral health—this is considered a moderate to high risk. Early identification and treatment of periodontal disease during pregnancy may reduce the risk of premature birth and low birth weight.
- A moderate association may exist between oral health and respiratory disease, with an average odds ratio of 3.04 for those at risk of developing respiratory disease.

A number of possible biological pathways link oral disease to systemic disease:

- oral biofilm that harbours biological pathogens
- transient or chronic bacteremia
- immunologic injury caused by endotoxins
- direct injury by lipopolysaccharides

Since periodontal disease is a potentially modifiable risk factor, being both preventable and treatable in most cases, dental hygienists may have an opportunity to contribute to decreasing the incidence and severity of these systemic diseases. This research opens the door for dental hygienists to work more collaboratively in interdisciplinary relationships with other health professionals. These findings can create opportunities for an integrated model of oral and general health and will strengthen the argument for an oral health system that is accessible to all citizens.

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*Since periodontal disease is a potentially modifiable risk factor...
dental hygienists may have an opportunity to contribute to
decreasing the incidence and severity of these systemic diseases.*

INTRODUCTION

A mid-16th century English proverb states that "the eyes are the window to the soul."¹ A 21st century proverb could well read, "the mouth is the portal to the body."

ALARGE BODY OF RESEARCH INDICATES A STRIKING association between the multifactorial etiology of oral and systemic diseases. Heart disease, preterm low birth weight babies, diabetes mellitus, and respiratory disease are being linked to periodontitis.

The purposes of this position paper are to (1) gather comprehensive research information to offer a critical look at the relationships between oral health and systemic health outcomes; and (2) to present recommendations supporting clinical practice, policy making, and self-care decisions. This paper was posted on CDHA's website for comments. Members' feedback was incorporated into the document to help establish a consensus among the association's members

on the recommendations. Several experts in the oral health field were also consulted. This paper will be reviewed at regular intervals to ensure that it includes the current research.

Although increased attention has lately been paid to the mouth-body connection, this area of research has actually existed for 100 years. In 1909, Dr. William Hunter devised the "focal infection" or "focal sepsis" theory, stating that dental (septic) infection was the most important cause and complication of medical diseases.² More recently, the term "periodontal medicine" has been used to describe a new oral health field that examines how periodontal infections interact intimately with the morbidity and mortality of individuals with certain systemic conditions.

For example, diabetes mellitus is currently considered a risk factor for periodontal disease. This is supported by large epidemiologic studies using multifactorial statistical analysis to ensure the results are not skewed by confounding co-risk factors.³

This paper examines the other side of the coin—the ways in which oral disease affects systemic health, specifically, chronic heart disease, respiratory disease, diabetes mellitus, and preterm low birth weight babies. Each of these diseases is examined separately below. Due to space considerations, the suspected associations between oral health and *Helicobacter pylori* infection, nutrition, rheumatoid arthritis, stress, osteopenia, and Kindler syndrome will be considered in a later position paper.

The oral-systemic disease link is important because of the high occurrence of oral disease—approximately 10% to 15% of the world's population is affected by advanced periodontal disease⁴ and more than 50% of adults 55 or older have periodontitis.⁵ If periodontal disease is associated with systemic disease, then its prevention may have a significant positive impact on the general health of Canadians and thus limit the human and financial costs of systemic health issues. The following literature reviews will look at the research that explores oral and general health associations as well as the intervention studies that show how dental hygiene treatment affects systemic health. Appendix A contains the definitions of terms as they are used in this paper.

DIABETES MELLITUS

DIABETES MELLITUS IS A SYSTEMIC DISEASE characterized by hyperglycemia and it affects approximately 2 million people in Canada, about 6.4% of the population.⁶ There are two types of diabetes: type 1, formerly called insulin-dependent diabetes, is caused by the complete or almost complete destruction of the pancreatic beta cells that produce insulin. Type 2, formerly called non-insulin-dependent diabetes, is the result of the body's inability to effectively use insulin so that glucose levels remain elevated. Risk factors for diabetes include a family history of diabetes, dyslipidemia, infertility, hirsutism, obesity, and smoking. Persistent poor glycemic control can lead to atherosclerosis, with complications such as retinopathy and nephropathy that may progress to blindness and end-stage renal disease.⁷ It is important to determine what factors disrupt glycemic control in diabetics, given that the annual cost of diabetes is estimated at almost \$9 billion,⁸ costs attributed to health care, disability, work loss, and premature death.

*Heart disease, preterm low birth weight babies,
diabetes mellitus, and respiratory disease
are being linked to periodontitis.*

METHODOLOGY

The methodological approach in this paper is a review of the literature. The primary focus centres on periodontal health status measures and their associations with systemic diseases. The researchers conducted a detailed search of relevant international English language epidemiological evidence from 1996 to 2003 using MEDLINE, EMBASE, and the Cochrane controlled trials register. The search also included "gray" literature—information not reported in the scientific periodical literature—and web sites known to contain publications on this topic. In addition, references cited in the articles were manually searched, as opposed to computer data base search. Lastly, we asked recognized experts in the topic area for other possibly relevant articles that may have otherwise not been identified.

In vivo and human studies identified in the literature search were included in this review; in vitro and animal studies were excluded. The research was classified according to the Canadian Task Force on the Periodic Health Examination Evidence Classification Scheme (see Appendix B).

Biological pathways

The following outlines the biologically based hypotheses to the link between periodontal disease and diabetes.⁹⁻¹³

1. There is a subgingival microbial infection of the periodontium and pocket epithelium.
2. The periodontium is a gateway to the systemic circulation.
3. The cell wall of the micro-organism releases endotoxins such as lipopolysaccharide and other products that increase insulin resistance.
4. The host responds to such products by releasing proinflammatory cytokines such as tumor necrosis factor ? (TNF-?), interleukin-6 (IL-6), and interleukin-1 beta (IL-1B) that interfere with lipid metabolism and insulin action.
5. The periodontal infection provides a source of micro-organism products such as lipopolysaccharides, which may amplify the magnitude of the advanced glycation end product-mediated cytokine upregulation.
6. When insulin is suppressed and the body becomes resistant to insulin, the increased level of glucose in the blood stream results in hyperglycemia.
7. Hyperglycemia results in the formation of advanced glycation end-products. The accumulation of advanced glycation end-products is linked to the development of the pathogenic complications of diabetes. (See Figure 1).

Long-term pain management tool?



NEW Canadian Consensus Report on dentin hypersensitivity recommends

a long-term approach to management, with desensitizing toothpaste as first-line treatment.†

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† Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity. Canadian Advisory Board on Dentin Hypersensitivity. *J Can Dent Assoc* 2003;69(4):221-226.

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—Valerie Gagnon, RDH, Pierrefonds, QC

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Research evidence

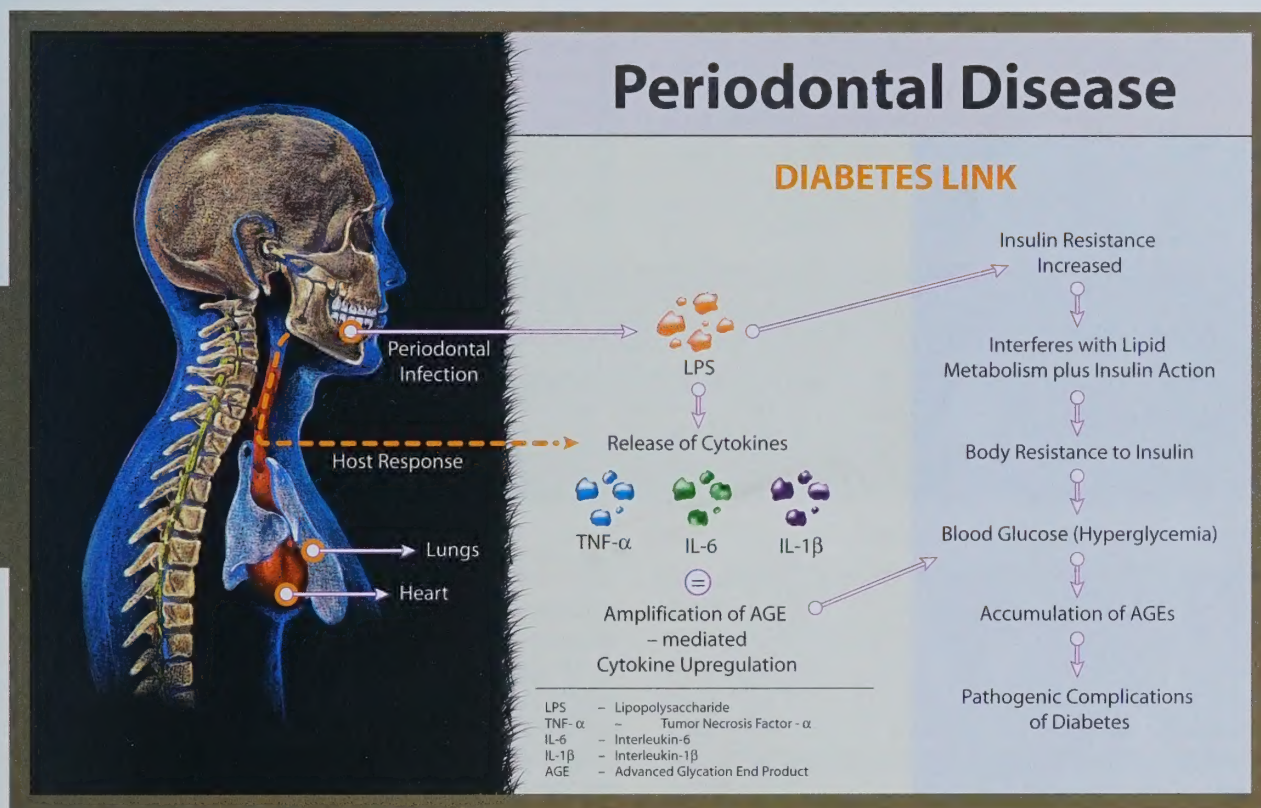
Substantial evidence supports diabetes as a risk factor for periodontal disease. Taylor in Teng et al. (2002)¹⁴ conducted a MEDLINE literature review and found that 44 of the 48 primary reports on studies provided consistent evidence of greater prevalence, incidence, severity, extent, or progression of periodontal disease in diabetic patients, including those with either type 1 or type 2 diabetes mellitus.

A relatively new finding is that a history of chronic periodontal disease can disrupt glycemic control, suggesting a possible adverse two-way interrelationships between periodontal disease and diabetes mellitus.¹⁴ The following three studies support this link. First, Taylor et al. (1996)¹⁵ studied the Pima Indian Tribe, a population having a prevalence of type 2 diabetes mellitus of about 50%. This is the highest reported prevalence of type 2 diabetes mellitus in the world,

and 1992–94 data that support an association between periodontal infection and glycemic control problems in people with diabetes mellitus.

A considerable body of research shows that periodontal therapy has a positive effect on glycemic control. Three researchers conducted literature reviews. Grossi and Genco (1998)¹² and Grossi (2001)¹⁸ reached the same conclusion in their reviews—that a beneficial effect on glycemic control is found when mechanical periodontal therapy includes the use of systemic antibiotics and that no significant improvement occurs when only mechanical therapy is used. Taylor (December 2001)¹⁹ reviewed 10 studies and concludes that treating periodontal infection may have an important role in establishing and maintaining glycemic control. However, he calls for additional rigorous clinical investigations in diverse populations.

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making this community ideal for studying periodontal disease and diabetes mellitus.¹⁶ Taylor et al. analyzed data collected in a longitudinal study of the Gila River Indian Community who are primarily Pima Tribe members. The data showed that those with severe periodontitis were up to six times more likely to have poor glycemic control, measured by glycated hemoglobin, at two- to four-year follow-ups.

Second, Collin et al. (1998)¹⁷ conducted a longitudinal study of seniors with type 2 diabetes mellitus that showed glycemic control in patients with advanced periodontitis deteriorated during a follow-up of two to three years. However, the glycemic control improved in those having a better periodontal condition. Third, Taylor (July 2001)⁹ analyzed cross-sectional data from NHANES III, using both the 1988–91

A number of other studies suggest that metabolic control of diabetes, measured by lower glycemic levels, is influenced by periodontal therapy, confirming the interrelationship between periodontal disease and diabetes mellitus. Table 1 contains a summary of the research.

Rodrigues et al. (2003)²⁰ conducted a randomized study with 30 type 2 diabetes mellitus subjects. Subjects had chronic periodontal disease, assessed by at least one site having a probing depth ≥ 5 mm and two teeth with attachment loss ≥ 6 mm. Subjects were randomly assigned to two treatment groups. Group 1 (G1) received full-mouth scaling and root planing in combination with amoxicillin/clavulanic acid (FMSRP & AC). Group 2 (G2) received FMSRP alone. Three months following therapy, both treatment groups showed statistically significant improvements in periodontal

Study	Study design	DM* type	Number subjects	F/U	Periodontal therapy
Rodrigues et al. 2003 ²⁰	Randomized clinical study; no control	Type 2	30	3 mths	G1 - full-mouth scaling and root planning (FMSRP) in combination with amoxicillin/clavulanic acid G2 - FMSRP only
Iwamoto et al. 2001 ²¹	Clinical study; no control	Type 2	13	1 mth	Anti-microbial treatment (local minocycline) and mechanical therapy
Aldridge et al. 1995 ²²	RCT	Type 1	31	2 mths	Oral hygiene instruction and mechanical therapy
Grossi et al. 1996 ²³	RCT	Type 2	85	3, 6 and 12 mths	Ultrasonic therapy and one of the following four: Group 1: systemic doxycycline and subgingival irrigation with water Group 2: systemic doxycycline and subgingival irrigation with chlorhexidine Group 3: systemic doxycycline and subgingival irrigation with povidone iodine Group 4: subgingival irrigation with water alone (placebo)
Grossi et al. 1997 ²⁴	RCT	Type 2	113	3 mths	Mechanical therapy combined with: 1. topical water and systemic doxycycline 2. topical chlorhexidine and systemic doxycycline 3. topical povidone-iodine and systemic doxycycline 4. topical CHX and placebo 5. control - topical water & placebo
Christgau et al. 1998 ²⁵	Prospective parallel treatment study	Type 1 and 2	a. 20 b. 20	4 mths	Phase one: oral hygiene instructions, mechanical therapy. Phase two: mechanical therapy and irrigation of pockets with chlorhexidine

* DM is diabetes mellitus

A considerable body of research shows that periodontal therapy has a positive effect on glycemic control.

parameters (including number of sites with biofilm, and bleeding on probing). Although the G1 and G2 groups showed improvements in levels of glycated hemoglobin (HbA_{1c}), only the HbA_{1c} reduction in G2 was statistically significant at 11% ($P < 0.05$). There were minimal alterations to the changes in fasting glucose levels in both groups. In addition, this study showed that subjects with an elevated degree of diabetes mellitus severity and periodontal disease had the greatest reduction in HbA_{1c} levels. A drawback to this study was a lack of significant change in attachment levels after therapy. The researchers suggest that the lack of additional benefit for Group 1 from the amoxicillin may be due to non-sensitive microorganisms in the periodontal pockets.

Although most of the intervention studies do not explore the details of the biological mechanism by which improved periodontal health leads to better glycemic control, Iwamoto et al. (2001)²¹ attempt to define this mechanism. They examine the role of the proinflammatory cytokine, tumor necrosis factor γ (TNF- γ), which is produced by periodontal infections. They conducted a study with 13 type 2 diabetes patients with periodontal disease who were given periodontal treatment consisting of antimicrobial therapy (local minocycline) and mechanical plaque debridement once a week for one month.

Following periodontal treatment, they found an average reduction of 0.49 pg/ml of circulating TNF- γ ($P < 0.015$) and an improvement in metabolic control of diabetes, measured by an average of 0.8% reduction in HbA_{1c} ($P < 0.007$). A drawback to this study is that the change in periodontal status showed only a 0.48 mm average reduction in probing depth one month after periodontal therapy—a result that was not statistically significant. This may be due to the fact that a one-month re-evaluation period is a relatively short time for changes in clinical attachment levels to occur.

The strongest research evidence comes from randomized controlled trials. However, our search uncovered only three randomized controlled trials that show the impact of periodontal treatment on glycemic control. Aldridge et al. (1995)²² conducted the first single-blind randomized controlled trial with 31 subjects and showed that periodontal treatment consisting of oral hygiene instruction and scaling has no effect on glycated hemoglobin.

Grossi et al. (1996)²³ conducted a randomized controlled trial with 85 Pima Indians with type 2 diabetes mellitus. All subjects received subgingival ultrasonic debridement of the teeth and were then assigned randomly to one of the following four groups for treatment:

Metabolic control outcome	Evidence level
G2 – Statistically significant 11% reduction in HbA _{1c} (P < 0.05)	II-3
Average reduction of 0.49 pg/ml of circulating TNF- α (P < 0.015) and an average of 0.8% reduction in HbA _{1c} (P < 0.007)	II-3
No effect on glycated hemoglobin	I
Ultrasonic therapy and doxycycline significantly reduced glycated hemoglobin (1% reduction P < 0.04)	I
Groups receiving doxycycline showed nearly 10% reduction in glycated hemoglobin	I
No change in HbA _{1c}	II-1

Table 1. Treatment studies examining the impact of periodontal therapy on diabetes

1. systemic doxycycline and subgingival irrigation with water
2. systemic doxycycline and subgingival irrigation with chlorhexidine
3. systemic doxycycline and subgingival irrigation with povidone iodine
4. subgingival irrigation with water alone (placebo)

The results indicated that subjects treated with doxycycline all experienced a significant reduction in glycated hemoglobin (1% reduction P < 0.04), suggesting that ultrasonic debridement plus systemic antimicrobial therapy has the potential to reduce the level of glycated hemoglobin in diabetic subjects.

Finally, Grossi et al. (1997)²⁴ conducted a randomized controlled trial with 113 subjects from the Gila River Indian Community, all of Pima or Pima/Papago heritage, with poorly controlled type 2 diabetes mellitus and severe periodontal disease. The examiner was blinded to the assigned treatment group. Researchers report that periodontal treatment consisting of scaling and curettage combined with antimicrobial treatment (systemic doxycycline) for two weeks resulted in a statistically significant reduction of nearly 10% (P $\leq$ 0.04) in glycated hemoglobin levels after three months and a 17% to 23% improvement in periodontitis. The glycated hemoglobin returned to basal level after six months when periodontal therapy was stopped.

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[†]Brushing twice daily with Sensodyne (containing either 5% w/w potassium nitrate or 10% w/w strontium chloride) builds and maintains a protective barrier to help prevent the pain from returning.

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Although all of the studies listed above, with the exception of Aldridge et al., indicate that periodontal therapy has a positive impact on glycemic control, two other studies refute this evidence. Christgau et al. (1998)²⁵ conducted a prospective parallel study comparing groups of well-controlled diabetics with healthy controls and found no connection between non-surgical periodontal therapy and diabetic control, measured by HbA_{1c}, at four-month follow-up. Periodontal therapy for moderate-to-advanced periodontitis consisted of two phases: the first included client motivation, oral hygiene instructions, supragingival scaling, emergency restorations, removal of overhanging margins, extractions of hopeless teeth, and splinting of mobile teeth. The second phase provided non-surgical periodontal therapy with subgingival scaling, root planing, and irrigation of all pockets with chlorhexidine. Hagiwara et al. (2002)²⁶ conducted a similar study and found no correlation between periodontal improvement and metabolic diabetes control. Rodrigues et al.²⁰ suggest that the lack of impact on glycemic control in these two studies may be because the subjects had only moderately controlled or well-controlled diabetes mellitus and that the study results may be different with subjects with a more severe degree of diabetes mellitus.

relationship. In addition, the randomized controlled trials examining periodontal treatment interventions were carried out with only one population, Pima Indians. The ability to generalize to a larger population was therefore limited.

The lack of emphasis on Canadian Aboriginal peoples also limits the impact of these studies. The effect of diabetes on Canadian Aboriginal people is more pronounced than in the general population. For First Nations people living on reserves, the incidence of diabetes is three to five times higher than that of the Canadian population;²⁸ for the off-reserve Aboriginal population, it is twice as high as the non-Aboriginal population.²⁹ Of particular concern is the increasing incidence rate of type 2 diabetes mellitus that is now occurring in children on reserve 5 to 8 years of age, although it was previously limited to the adult population.^{30,31}

Recommendations

Clinical

Some general suggestions for dental hygienists follow; however, all clinical decisions should be based on the needs of the specific client:

The evidence overall ... supports the recent recognition of periodontal disease as the sixth complication of diabetes.²⁷

Discussion

The evidence overall shows that periodontal disease may contribute to poorer glycemic control in people with diabetes mellitus and supports the recent recognition of periodontal disease as the sixth complication of diabetes.²⁷ This review also highlights a considerable body of research showing that periodontal therapy may be associated with improved glycemic control and that the mode of therapy affects the outcome. The balance of evidence from the treatment studies suggests that mechanical periodontal therapy together with systemic antibiotics should be part of the standard of care of the diabetic client with periodontitis, since mechanical periodontal therapy by itself did not generally result in improvements in glycemic control. Also, the randomized controlled trial studies provide an argument for the inclusion of periodontal treatment in diabetes preventive measures.

Although some important information arises from this research, a few of the studies are somewhat limited by the small number of subjects and a heterogeneity in design, conduct, and results that restricts the ability to compare the studies. A further difficulty in comparing studies arises from the different ways in which periodontal disease is defined. A wide range of measurement parameters is used, including gingivitis, probing depths, clinical attachment level scores, and radiographically assessed alveolar bone loss. The most striking limitation is the low number of randomized controlled trials as this type of trial has the potential for providing the best evidence for the presence or absence of a causal

- Incorporate the bi-directional relationship of diabetes and chronic periodontitis into diagnostic and treatment decisions.
- Implement three levels of prevention, including primary, secondary, and tertiary. (See Appendix C.) The prevention and control of periodontal disease should be considered an integral part of diabetes control and prevention.
- Treat periodontitis in diabetic clients the same as in non-diabetic patients; however, diabetic clients with poor metabolic control should be seen more frequently and mechanical periodontal therapy combined with systemic antibiotics should be part of the standard of care.
- Assess glycemic control of diabetic clients by asking about their blood glucose self-monitoring practices and test results, including HbA_{1c} tests.
- Provide oral health promotion and disease prevention services for persons with diabetes in community health centres, health units, and public health programs.

Suggestions for other health professionals with clients with glycemic difficulties:

- Consider the periodontal status of clients with diabetes who have difficulty controlling glycemic levels.
- Refer clients to an oral health professional to reduce the prevalence of periodontal infection and inflammation.

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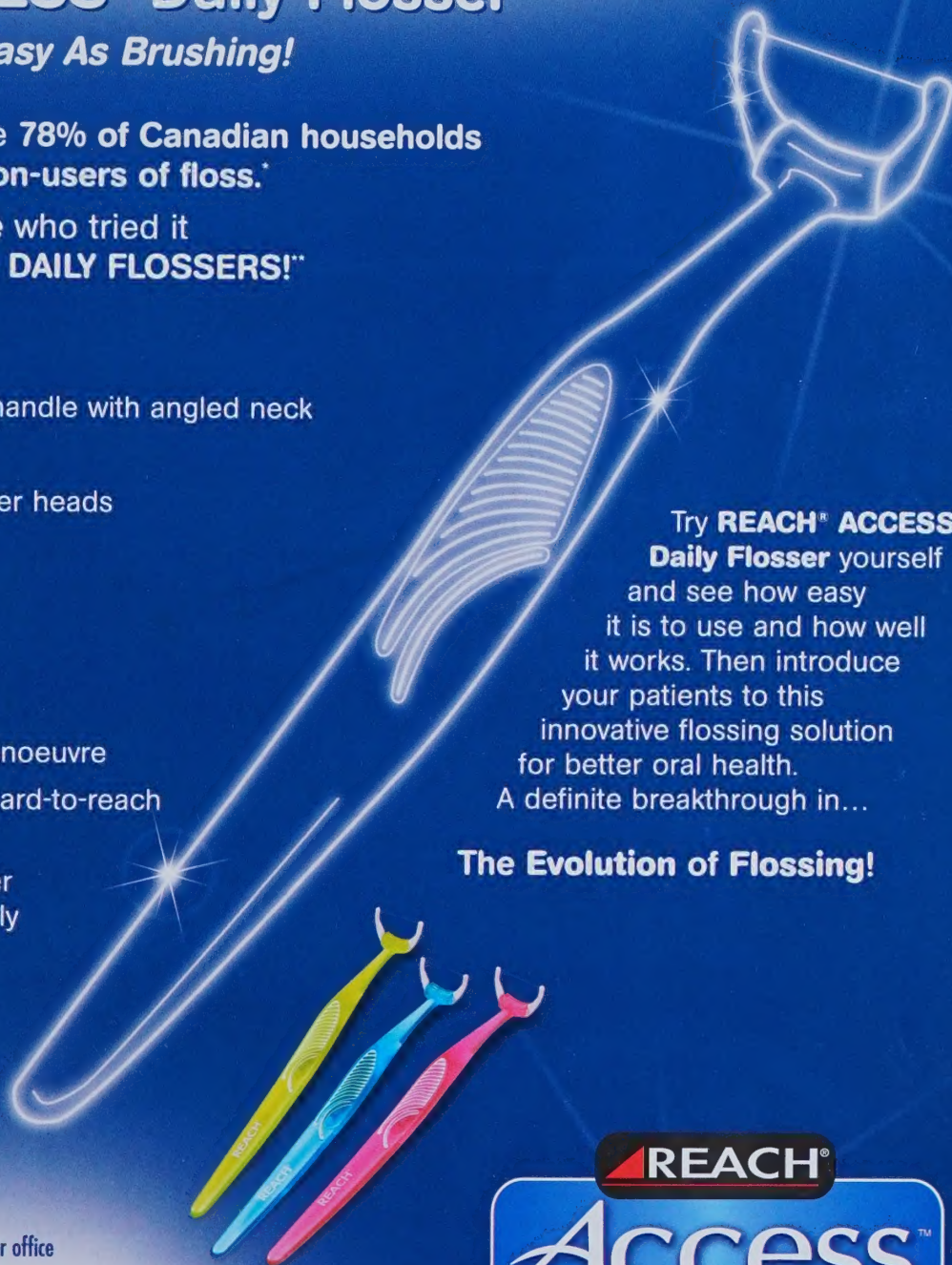
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* A.C. Nielson Consumer Facts 2002.

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Designed for Compliance

Research

- Develop uniform study criteria for measuring periodontal disease.
- Further research is needed in the following areas:
 - studies to show that long-term periodontal care contributes to the long-term management of diabetes mellitus;
 - randomized controlled trials with more diverse populations and populations that are particularly susceptible to diabetes mellitus, such as Aboriginal peoples;
 - studies on health promotion initiatives to prevent the development of periodontal disease and diabetes mellitus.

HEART DISEASE

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CARDIOVASCULAR DISEASES (CVD) (E.G. ATHEROSCLEROSIS, coronary thrombosis, ischemic heart disease, coronary heart disease, and peripheral vascular disease) affect a significant proportion of the Canadian population and comprise one of the major causes of death.³² Atherosclerosis, which involves plaque-containing cholesterol, builds up in arteries and results in coronary thrombosis, ischemic heart disease (coronary artery disease), and stroke.

Infective endocarditis occurs when there is microbial infection of damaged heart valves or endocardium. Acute bacterial endocarditis has a rapid onset and death is usually the outcome unless antibiotic therapy is prescribed following the criteria of the American Heart Association. Subacute bacterial endocarditis has a more chronic course, where the problem may not be obvious until the onset of a low-grade fever, anemia, and debility. It is well accepted that dental procedures predispose susceptible patients to infectious endocarditis through transient oral bacteremias³³ and that antimicrobial prophylaxis should be administered prior to certain oral health procedures.³⁴ However, due to ethical considerations, it has not been possible to perform controlled clinical trials in humans to establish their effectiveness. The estimated frequency of infectious endocarditis varies from between 1 and 5 cases/100,000 population/year.³⁴

Biological pathways

The current theory around this issue is that micro-organisms in infected gums may dislodge, enter the bloodstream, and spread throughout the body, inflaming coronary arteries and causing changes in blood pressure, heart rate, heart function and promoting blood clots, which can lead to heart attacks and strokes. Periodontal micro-organisms may also cause an infection in the lining or valves of the heart called infective endocarditis.

Authors propose three pathways linking oral infections to cardiovascular disease:

1. Infection theories^{35,36}

This involves the direct negative effect of bacteremia from a periodontal inflammation. Subgingival biofilms associ-

ated with periodontitis may act as reservoirs of gram-negative micro-organisms and create transient bacteremia that enter the bloodstream and have access to the lining of blood vessels. Bacteremia associated with *Porphyromonas gingivalis* may result in platelet aggregation that contributes to some atheroma formation and acute thromboembolic events.^{37,38}

2. Distant injury (focal sepsis) theory^{35,36}

Injury results from the effects of circulating oral microbial toxins. Three mechanisms are involved.

- a. Endotoxins from the cell wall of oral micro-organisms are released and circulate throughout the body, causing the release of inflammatory mediators and clotting factors such as C-reactive protein and fibrinogen. These in turn increase platelet aggregation, damage endothelial cells, induce smooth muscle proliferation, and result in the formation of atheromas and subsequent atherosclerosis and thrombosis.^{39,40} Some proof for this comes from a growing body of evidence showing periodontal microorganisms are found in atheromas.⁴⁰
- b. Products associated with bacteremia, such as micro-organism-derived lipopolysaccharides, trigger hyper-reactive leukocyte responses. Infections produce changes in lipid metabolism that may promote atherosclerosis.
- c. Periodontal microbial infections may cause an immune response that results in a hyperinflammatory macrophage response. Macrophages release inflammatory mediators/proinflammatory cytokines, such as interleukin 1 β [IL-1 β], tumor necrosis factor- α (TNF- α), TxA₂/IL-1 β , MCP-1,³⁸ and PGE₂. The cytokines produced by the macrophages play a critical role in the formation of the atheroma in atherosclerosis.^{39,41} This hypothesis is supported by recent findings that total cholesterol, low-density lipoprotein, and triglycerides are significantly higher in subjects with periodontitis than in controls.⁴¹

3. A link to glucose tolerance

Periodontal infection can reduce glucose tolerance, leading to an atherogenic serum lipid profile.⁴⁰

Research evidence

There has been a proliferation of research on the link between cardiovascular disease and periodontal disease and tooth loss, focusing specifically on coronary heart disease, cerebrovascular ischemia, fatal cardiovascular disease, stroke, myocardial infarction, cerebrovascular accident, and the preclinical signs of cardiovascular disease. A brief description of the research showing a link is organized under categories of heart diseases. The research refuting this link is then presented. The research is also summarized in Table 2, and a discussion of the research follows.

Coronary heart disease, fatal coronary heart disease, and stroke

Beck et al. (1996)³⁶ conducted a prospective, longitudinal, cohort study with 1,147 men who received a dental examination and radiographs at approximately 3-year intervals for

18 years. They showed that periodontal diseases, as assessed by bone loss and worst probing pocket depth scores per tooth, increased the odds ratio (OR) of coronary heart disease by 1.5 (95% CI: 1.06 - 2.15), of fatal coronary heart disease by 1.9 (95% CI: 1.10 - 3.34), and of stroke by 2.8 (95% CI: 1.45 - 5.48). They used multiple logistic regression to control for the effects of age, smoking, diabetes mellitus, family history, body mass, blood pressure, and alcohol use.

Cerebrovascular accident and fatal cerebrovascular accident

Loesche et al. (1998)⁴² conducted a cross-sectional study with 401 veterans who were at least 60 years of age. The researchers found that in the dentate group of 232 seniors, the presence of 15 to 28 teeth and an increased proportion of teeth with attachment loss >6 mm were significantly related to a cerebrovascular accident odds ratio of 1.04.

Wu et al. (2000)⁴³ examined data from a cross-sectional study, the First National Health and Nutrition Examination Survey (NHANES I) and its follow-up study (NHEFS), a representative sample of 9,962 U.S. adults. The exposure variable was periodontal disease and the outcome variables

with 25 teeth or more (hazard ratio 1.57; 95% CI, 1.24 to 1.98). Recent tooth loss showed little association. A modest association was found between baseline periodontal disease and ischemic stroke (Hazard ratio 1.33; 95% CI, 1.03 to 1.70). A self-assessment tool was used for the oral health assessment.

Coronary heart disease

DeStefano et al. (1993)⁴⁵ also analyzed National Health and Nutrition Epidemiologic Follow-Up Study (NHEFS) data, a 14-year follow-up of 9,760 participants who ranged from 25 to 74 years of age. This prospective cohort study showed a relative risk (RR) for myocardial infarction of 1.25 (95% confidence interval [CI]) for periodontal disease and 1.23 (95% CI) for complete edentulousness, compared with no dental disease. They found that men with periodontitis were 25% more likely to develop coronary heart disease than those with minimal periodontal disease. The risk was particularly high for men aged 29 to 49 who had a relative risk for coronary heart disease of 1.72 (95% CI).⁴⁵ They controlled for most major coronary heart disease risk factors. Smoking data, however, was not available for two-thirds of the participants.

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Dental procedures predispose susceptible patients to infectious endocarditis through transient oral bacteremias.

were incident and fatal events of cerebrovascular accident, instead of coronary heart disease, which is more often studied. First, they showed a significant association (relative risk 2.11, 95% CI, 1.3-3.42) between periodontitis and cerebrovascular accident—specifically nonhemorrhagic stroke but not hemorrhagic stroke—compared with no periodontal disease. Second, they demonstrated significant associations between periodontitis and fatal cerebrovascular accident. They used multivariate analyses and adjusted for a number of confounders and conclude that periodontal disease is a significant risk factor for cerebrovascular accident. One of the strengths of this study is that it included not only white men, but also white women and African Americans.

Elter et al. (2003)⁴⁴ conducted a study using the Dental Atherosclerosis Risk in Communities (ARIC) study data with 9,415 persons and found that attachment loss and edentulism were weakly associated with stroke/transient ischemic attack (OR 1.3, CI 1.02-1.7) and (OR 1.4, CI 1.5-2.0). Logistic regression analysis controlled for confounders.

Joshi et al. (2003)⁴⁰ in a 12-year Health Professionals Follow-Up Study (HPFS) cohort study with 41,380 men who were free of cardiovascular disease and diabetes at baseline showed that tooth loss and periodontal disease may be independent risk factors for stroke. They used a multivariate analysis and confounding variables—such as common risk factors shared by stroke, periodontal disease, and tooth loss—were accounted for. Men with 24 teeth or fewer at baseline were at higher risk of stroke compared with men

Joshi et al. (1996)⁴⁶ analyzed the Health Professionals Follow-Up Study (HPFS) composed of 44,119 men, 40 to 75 years of age, and found increased relative risk (RR) for coronary heart disease for people with both periodontal disease and tooth loss (RR 1.7) and periodontal disease and no tooth loss (RR 1.7). This was a 6-year follow-up study of subjects who reported no diagnosed coronary disease at baseline. A number of coronary risk factors, such as smoking and physical activity, were accounted for in the study.

Diagnosis of periodontitis in most studies is based on clinical or radiographic examination. However, it is also possible to diagnose serum antibodies to the primary pathogens responsible for periodontitis, *Actinobacillus actinomycetemcomitans* and *Porphyromonas gingivalis*. Some data indicate that the inflammatory and host responses, not the clinical signs of periodontitis, are associated with cardiac events and subclinical coronary artery disease. One study shows an association between levels of immunoglobulin G (IgG) antibodies to periodontal pathogens and coronary artery disease.

Pussinen et al. (2003)⁴⁷ conducted the first study using serum antibodies as a form of diagnosis and found a link between serum IgG-antibodies to these two periodontal pathogens and coronary heart disease. Using a multivariate linear regression model, they found that of the 1,163 subjects studied, those with a high combined antibody response had an odds ratio of 1.5 (95% CI, 0.95 to 2.50, P=0.077) for coronary heart disease.

Reference	Study type	Logistic regression analysis	# Subjects case/controls	PVD	CVD	CHD	CVI	Fatal CHD/CVA/CVD
Beck et al. 1996 ³⁶	Prospective, longitudinal	Yes	1,147 men			1.5 OR		1.9 OR
De Stefano et al. 1993 ⁴⁵	Prospective cohort NHEFS	Yes, but did not control for smoking	9,760					
"	"	"	"					
"			Men aged 29-49			1.72 RR		
Pussinen et al. 2003 ⁴⁷	FPAIS	Yes	1,163			1.5 OR		
Joshiyura et al. 1996 ⁴⁶	HPFS		44,119 men			1.7 RR		
"	"					1.7 RR		
Joshiyura et al. 2003 ⁴⁰	HPFS	Yes	41,380 men					
"	"	"						
"	"	"						
Grau et al. 1997 ⁴⁸	Case/control	Yes	166/166				2.6 OR	
Morrison et al. 1999 ⁵¹	NCS		10,368 without CAD; 11,251 with CVD					2.15
"								1.37
"								1.9
Jansson et al. 2001 ⁵²	Epidemiological	Yes	393 men and women					Significant correlation
Mendez et al. 1998 ⁵³		Yes		2.27 OR				
Hung et al. 2003 ⁵⁴	Prospective HPFS		45,136 men	1.88 RR				
Beck et al. 2001 ⁴⁹	Prospective	Yes	6,017 African Americans					
Loesche et al. 1998 ⁴²	Cross-sectional		401 senior veterans					
Wu et al. 2000 ⁴³	Cross-sectional NHANES & NHEFS	Yes	9,962 black, & Caucasian men and women					Significant associations fatal CVA
Desvarieux et al. 2003 ⁵⁰	Prospective	Yes	711					
"	"	"						
Tuominen et al. 2003 ⁵⁵	12-year follow-up MFHS	Yes	6,527 men and women					No association
Hujoel et al. 2000 ⁵⁶	NHANES follow-up study	Yes	8,032		No association			
Elter et al. 2003 ⁴⁴	Dental ARIC study	Yes	9,415					
"	"	"						

Table 2. The association of heart disease, the systemic outcome, with periodontal disease and tooth loss (Evidence Level

ARIC Dental Atherosclerosis Risk in Communities Study

HPFS Health Professionals Follow Up Study

NHANES National Health and Nutrition Examination Survey

NHEFS National Health and Nutrition Epidemiologic Follow-Up Study

NCS Nutrition Canada Survey

MFHS Mini-Finland Health Survey

FPAIS Finland Platelet Aggregation and Inflammation Study

CVA/ Stroke	MI	Pre-clinical signs of CVD	Oral Exposure
2.8 OR			PD
	1.25 RR		PD
	1.23 RR		E
			PD
			IgG-antibodies to periodontal pathogens
			PD and tooth loss
			PD and no tooth loss
1.57 HR			Fewer than or equal to 24 teeth
Little association			Recent tooth loss
1.33 HR			PD
			PD
			Severe gingivitis
			Periodontitis
			Edentulousness
			PD
			PD
			Cumulative tooth loss & PD
		1.31 OR	PD – severe
1.04 OR			15 to 28 teeth and an increased proportion of teeth with attachment loss >6 mm
2.11 RR non- hemorrhagic stroke			PD
		44%	0 to 9 missing teeth
		61%	10 to 19 missing teeth
			PD
			PD and gingivitis
OR 1.3			Attachment loss
OR 1.4			Edentulism

11-2)

PD Periodontal disease
OR Odds ratio
E Edentulism
RR Relative risk
CVI Cerebrovascular ischemia

HR Hazard ratio
CVA Cerebrovascular accident
PVD Peripheral vascular disease
MI Myocardial infarction

Cardiovascular disease

Grau et al. (1997)⁴⁸ conducted a case-control study where cases consisted of 166 subjects with cerebrovascular ischemia and controls consisted of 166 non-stroke neurological subjects. Dental status, which was blindly assessed, was determined by a total dental index (TDI) that reflects caries, periapical lesions, periodontitis, and other dental lesions. Using a multiple logistic regression analysis, the researchers concluded that chronic dental infection might be associated with an increased risk for cerebrovascular ischemia (OR = 2.6; 95% CI, 1.18 - 5.7), independent of current smoking, diabetes mellitus, and pre-existing vascular diseases.

Preclinical signs of cardiovascular disease

The two following studies are set apart from the above studies since they measure the relationship between periodontal disease and the preclinical signs, instead of the clinical signs, of cardiovascular disease. The intima-media wall thickness of the carotid artery is a measure of preclinical atherosclerosis and is associated with coronary heart disease and with incident stroke.⁴⁹ First, Beck et al. (2001)⁴⁹ conducted a prospective study with 6,017 black subjects and showed that periodontitis is associated with these preclinical signs of ath-

erosclerosis. Using a multivariable logistic regression model, they found that individuals with severe periodontal disease, measured by attachment loss, had 1.3 times the odds of having thick carotid arterial walls (greater than and equal to 1 mm) compared with individuals with less severe disease (OR 1.31, CI 1.03 to 1.66). Second, Desvarieux et al. (2003)⁵⁰ reports preliminary findings from 711 participants in a prospective study that shows a possible relationship between tooth loss (which is a marker of past periodontal disease) and subclinical cardiovascular disease/subclinical atherosclerosis, measured with a carotid scan using ultrasound. The cohort was free of baseline cardiovascular disease. Regression models were used to account for conventional risk factors. The prevalence of carotid plaque increased with the number of missing teeth, with an average of 44% of those missing zero to nine teeth having artery plaque, and 61% (P<0.05) of those with 10 to 19 missing teeth having artery plaque. The researchers found a significant relationship between tooth loss and periodontal disease and suggest that this is related to subclinical atherosclerosis.

Fatal cardiovascular disease

Morrison et al. (1999)⁵¹ conducted a cardiovascular mortality follow-up on 10,368 individuals without coronary artery disease and on 11,251 individuals with cerebrovascular and coronary heart disease from the Nutrition Canada Survey. Participants were followed retrospectively for assessment of cardiovascular mortality status from the National Mortality Database. They found an RR of 2.15 (95% CI: 1.25-3.72) for



SOFT DRINKS...HARD ON TEETH AND BONES



Children who drink soda instead of milk expose themselves to long-term problems with their teeth and fail to get enough bone-building nutrients.

These days, one of the big issues facing high school administrators is whether to ban soft drink vending machines. I could give them a long list of reasons why they should, starting with the fact that soft drink consumption displaces milk, and there isn't a worse time for that than the school years—when tooth enamel is immature and easily dissolved by acids,¹ and when nearly 40% of peak bone mass is accumulated.²

Unfortunately, during the progression from childhood into adolescence, the prevalence of milk intake decreases and that of soft drinks more than triples.³ The impact is measurable and far-reaching. Drinking acidic, carbohydrate-rich soft drinks puts kids at high risk for aggressive caries development.¹ And the impact on bones is potentially even graver. Studies suggest that

as little as a 5-10% deficit in peak bone mass may result in a 50% greater lifetime prevalence of hip fracture.² American data over the past 30 years demonstrate a significant increase in distal forearm fractures in children and adolescents, with the peak incidence and greatest increase occurring between the ages of 11 and 14 years in boys and 8 and 11 years in girls.⁴ The reasons are likely poor calcium intake and/or changing patterns of physical activity.⁴ Earlier studies in New Zealand have shown that children with forearm fractures have lower bone mineral density throughout the skeleton.⁵

The facts are unequivocal: kids don't need soft drinks, but they do need milk, as well as exercise. In a study of pre- and early-pubertal girls, the effect of moderate exercise plus calcium on bone mineral content at the femur was greater than either factor alone,⁶ likely because exercise confers region-specific effects whereas calcium produces generalized skeletal effects.⁶ Likewise, another study showed that 13-to-17-year-old boys who drank milk or juice in combination with a 12-week program of resistance increased their bone density, but those who drank milk had more than twice the increase.⁷

Milk drinking has been positively associated with the achievement of recommended intakes of vitamin A, folate, vitamin B₁₂, calcium and magnesium.⁸ Maybe it's time to start a trend towards snacking on milk and milk products. Filling school vending machines with chocolate milk and similarly healthful foods could go a long way in changing bad habits.

**Drinking soda instead of milk
increases kids' risk of caries.**

References: 1. Erickson PR et al. 2001. Soft drinks: Hard on teeth. *Northwest Dentistry*, March/April:15-19. Accessed at: http://amm.mndental.org/client_files/documents/Soft_Drinks_Hard_on_Teeth.pdf. 2. American Academy of Pediatrics, Committee on School Health. 2004. Policy Statement: Soft drinks in schools. *Pediatr* 113:152-154. 3. Frary CD et al. 2004. Children and adolescents' choices of foods and beverages high in added sugars are associated with intakes of key nutrients and food groups. *J Adolesc Health* 34:56-63. 4. Khosla S et al. 2003. Incidence of childhood distal forearm fractures over 30 years. *JAMA* 11:1479-1485. 5. Goulding A et al. 1998. Bone mineral density in girls with forearm fractures. *J Bone Miner Res* 13:143-148. 6. Iuliano-Burns S et al. 2003. Regional specificity of exercise and calcium during skeletal growth in girls: a randomized controlled trial. *J Bone Miner Res* 18:156-162. 7. Volek JS et al. 2003. Increasing fluid milk favorably affects bone mineral density responses to resistance training in adolescent boys. *J Am Diet Assoc* 103:1353-1356. 8. Ballew C et al. 2000. Beverage choices affect adequacy of children's nutrient intakes. *Arch Pediatr Adolesc Med* 154:1148-1152.

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severe gingivitis; 1.37 (95% CI: 0.80-2.35) for periodontitis; and 1.90 (95% CI: 1.17-3.10) for edentulousness for fatal coronary heart disease.

Similar findings are reported in an epidemiological study by Jansson et al. (2001)⁵² with 1,393 men and women. Plaque and oral health scores, measured with missing teeth, apical lesions, caries lesions, and marginal bone loss, were adjusted for age, gender, smoking, and cardiovascular disease at baseline and showed a significant correlation to fatal cardiovascular disease.

Peripheral vascular disease and peripheral arterial disease

Studies of the link between oral health and cardiovascular disease and coronary heart disease are common. However, less common are studies showing the link between oral health and peripheral vascular disease, which can be divided into two areas, peripheral arterial disease and peripheral venous disorders, both of which can potentially lead to heart disease or stroke. Mendez et al. (1998)⁵³ found an association between periodontal disease and peripheral vascular disease (OR = 2.27; 95% CI: 1.32-3.9) after controlling for several other risk factors. Hung et al. (2003)⁵⁴ conducted a prospective study with 45,136 male subjects, 342 of whom were identified with peripheral arterial disease during a 12-year follow-up period. Periodontal disease and tooth loss were self-reported. The strongest association between cumulative incident tooth loss and peripheral arterial disease was found among men with periodontal disease (RR 1.88, 95% CI, 1.27 - 2.77, P=0.09).

Studies refuting association between periodontal disease, and cardiovascular disease and coronary heart disease deaths

There are many studies showing that various types of oral infections are possible risk factors for coronary heart disease and cardiovascular disease. Two studies that refute this connection follow. Tuominen et al. (2003)⁵⁵ analyzed information from 6,527 men and women, aged 30 to 69, from the Mini-Finland Health Survey. They found that when the data, collected during a mean 12-year follow-up, were adjusted for established coronary heart disease risk factors, there was no statistically significant association between oral health indicators and coronary heart disease deaths. Oral health indicators included gingival inflammation, periodontal pocket depths, dental plaque status, and edentulousness. Hujoel et al. (2000)⁵⁶ uses the same data set, NHANES I follow-up study, as did Wu et al. (2000) and DeStephano et al. (1993), but reached very different conclusions. Hujoel et al. did not find a significant association between cardiovascular disease and periodontitis and gingivitis after adjustment for known cardiovascular risk factors.

Discussion

The balance of the evidence suggests that periodontal disease and tooth loss may be independent risk factors for cardiovascular disease. The associations between oral conditions and cardiovascular disease are consistent across different population samples—including international studies from Canada, the United States, and Finland—and different measures of periodontitis, for example, bone loss and probing depth. However, there is insufficient evidence to show a

definitive causal relationship between periodontal disease and tooth loss and cardiovascular disease. There is only minor opposition to the suggested association, since all but 2 of the 17 studies indicated that periodontal disease and tooth loss might be independent risk factors for cardiovascular disease. A summary of the strength of the associations follows, showing that persons with periodontal disease have a 1.04 to 2.8 fold greater risk of incurring cardiovascular disease than persons without periodontal disease. Of the different types of cardiovascular disease, stroke shows the most robust association.

- Cardiovascular accident, stroke
 - OR 2.8 for periodontal disease
 - HR 1.33 to 1.57 for periodontal disease and fewer than or equal to 24 teeth
 - RR 2.11 for periodontal disease
 - OR 1.04 for attachment and tooth loss
- Cardiovascular ischemia
 - OR 2.6 for periodontal disease
- Peripheral vascular disease
 - OR 2.27 for periodontal disease
 - RR 1.88 for periodontal disease and tooth loss
- Coronary heart disease
 - OR 1.5 for periodontal disease
 - RR 1.7 to 1.72 for periodontal disease and tooth loss
- Fatal cardiovascular disease
 - OR 1.37 to 2.15 for periodontal disease, severe periodontal disease and tooth loss
- Myocardial infarction
 - RR 1.23 to 1.25 for periodontal disease and edentulousness
- Preclinical signs of cardiovascular disease
 - OR 1.31 periodontal disease

Although the OR (odds ratio) and RR (relative risk) showed a low-to-moderate association of 1.04 to 2.8, modest associations may have a significant impact within the population since the prevalence of both periodontitis and cardiovascular disease is very high. There is a dose-response relationship to this association whereby the severity of periodontal disease influences the strength of the association, as shown in Beck et al. (1996)³⁶ and Beck et al. (2001).⁴⁹ The association is also characterized by the quality of the host response as the antibody response was related to a high incidence of coronary heart disease. In one of the studies, Beck et al. (1996)³⁶ found that periodontal disease—compared with more established risk factors such as smoking, diabetes, hypertension, and elevated serum triglycerides—may be associated with excess risk of coronary heart disease/stroke.

Although almost all of the studies measured the clinical signs of cardiovascular disease, two studies by Beck et al. (2001)⁴⁹ and Desvarieux et al. (2003)⁵⁰ were different in that they found an association between periodontal disease and tooth loss and preclinical signs of cardiovascular disease. These two studies established that oral health studies could successfully use ultrasound measurement of the intima-media wall thickness, a quick and non-invasive way to measure atherosclerosis.

Since periodontitis and atherosclerosis have many risk factors in common, including diet, smoking, and diabetes mel-

litus, it is important for research evidence to include a multifactorial regression model to control for these common risk factors. Fortunately, all of the research studies used a multiple logistic regression model to analyze the data and control for confounding health issues. Only one researcher, DeStefano et al. (1993),⁴⁵ noted that smoking data were not available for two-thirds of subjects and therefore they could not control for this potential confounder.

In general, the reviewed studies used a large number of subjects with the majority (nine) using between 1,000 and 11,000 subjects and three studies using over 40,000 subjects. This makes it possible to generalize to a larger population. Although most of the studies had a large number of subjects, some studied only segments of the population, such as men, African-Americans, and veterans. This made it difficult to generalize to the larger population.

There are several other limitations to the research. Most of the associations had a small-to-medium magnitude or a weak association. It therefore may be possible that the associations are due to various types of bias in the studies: additional confounders not accounted for, such as genetic and environmental factors that increase susceptibility to both chronic oral infection and cardiovascular disease; or the fact that good oral health is an indicator of good general health care practices.

The study type also presented limitations. Unfortunately, none of the studies were classified as having level 1 or level 11-1 evidence (see Appendix B for Evidence Classification Scheme). Therefore a causal role for periodontal disease and tooth loss in cardiovascular disease cannot be established. The majority of the studies were classified as level 11-2, with the majority being prospective longitudinal or cross-sectional cohort studies and only one being a case-control study, therefore suggesting an association only. Another limitation is the total absence of intervention studies.

Inconsistencies in the various study designs preclude a rigorous systematic review. Study comparison was also difficult due to inconsistent quantitative assessments of oral health or periodontal disease. A wide variety of the following combinations of measures were used: bone loss, pocket depth scores, and attachment loss. Furthermore, while most studies used clinical assessments, some did not measure level or severity of infection and others used self-reporting, a method that has been questioned as imprecise.⁵⁷

Furthermore, a number of the studies were secondary analyses from data that were not gathered specifically to investigate an association between oral health and heart disease. Therefore, to confirm the risk factor more clearly, it would be helpful to have studies designed specially for this purpose.

Periodontal disease may some day be considered next to smoking and diabetes as having a strong association with cardiovascular disease. Before this occurs, however, more extensive interventional, longitudinal research is needed to determine to what extent treatment of periodontal disease will decrease the incidence of heart disease.

Recommendations

Clinical

Oral procedure guidelines for individuals at risk for developing infective endocarditis include three steps.^{58,59} However, dental hygienists should use their own clinical judgment in individual cases or special circumstances.

1. Clients at high and moderate risk for infectious endocarditis who are undergoing dental procedures that will induce bleeding should be given antibiotic prophylaxis according to the most current American Heart Association recommendations. (See Appendix D for definitions of "at-risk" and a list of oral procedures that create a risk of bacteremia.) It should be noted that antibiotic prophylaxis does not preclude infective endocarditis; it only minimizes the risks, since a considerable portion of oral micro-organisms do not respond to the β -lactam class of antibiotics (which includes amoxicillin, the current popular antibiotic). It is therefore important to implement step 2 to minimize gingival inflammation and prevent the initiation of periodontal disease.
2. Establish and maintain good oral health:
 - Apply antiseptic mouth rinses, such as chlorhexidine gluconate and povidone-iodine, via gentle oral rinsing for about 30 seconds immediately before dental procedures.
 - Frequent home use of antiseptic rinses is not recommended due to the potential for developing resistant microorganisms.
 - Frequent dental hygiene treatments are recommended to maintain periodontal health.
 - Encourage clients to make use of Pre-medication Alert Wallet Cards. These cards are completed by cardiologists to alert the dental hygienists to a client's risk factors and required protection from bacterial endocarditis, so that antibiotic treatment may be administered immediately prior to any invasive treatment. (For a copy of the card, visit <www.american-heart.org/presenter.jhtml?identifier=11086>.)
3. Educate clients concerning periodontal health:
 - Emphasize the importance of maintaining good periodontal health through frequent dental hygiene treatment and appropriate home care methods.
 - Ensure that clients who have other risk factors for cardiovascular disease or who may already have cardiovascular disease are informed about the potential correlation between periodontal disease and cardiovascular disease.

Research

There is a need for additional research in intervention longitudinal studies and health promotion and its impact on periodontal disease and cardiovascular disease.

The next two areas to be discussed, respiratory disease and preterm low birth weight infants, will appear in the next issue (July/August 2004) of this journal.

APPENDIX A

Definitions

This section defines terms as they are used in this report.

Bacteremia: the presence of micro-organisms in the bloodstream. Transient bacteremia can be caused by oral micro-organisms entering the bloodstream through chewing, toothbrushing, flossing, periodontal infections, and some dental procedures.

Case-control study: a retrospective study in which people with a condition are compared with people without it, but who are similar in other characteristics

Causality: a cause for systemic diseases can be determined only by means of a randomized controlled trial (RCT). This study design allows the potential causal factors to be controlled by the investigator, who assigns persons randomly to the experimental and control groups.

Confidence interval (CI): the range within which the true size of effect lies with a given degree of assurance. A 95% confidence interval is the interval that includes the true value in 95% of cases.

Cross-sectional study: a study in which the health conditions of a group of people who are, or are assumed to be, a sample of a particular population are assessed at one time.

Gingivitis: an infectious inflammatory process limited to the gingiva.

Infection: invasion and proliferation of micro-organisms or other pathogenic microorganisms in body tissues and the reaction of the tissues to their presence.

Logistic regression: statistical analysis that allows the separation and measurement of the relative contributions of a number of factors from among many risk factors that are present at the same time. For example, logistic regression can be used to describe how periodontal infection independently contributes to preterm low birth weight in infants, when other risk factors such as smoking are also present. Multiple/multivariate/multifactorial/multivariable logistic regression is the relationship between the dependent variable and more than one independent variable. Conditional logistic regression is used to investigate the relationship between an outcome and a set of prognostic factors in cohort and matched case-control studies.

Longitudinal study: a study in which the same group of people is studied on two or more occasions.

Nosocomial pneumonia: hospital acquired pneumonia

Odds ratio (OR): measurement of risk used in case-control studies where risks are examined retrospectively for those with and without disease. It is calculated by taking the number of people with a disease who were exposed to the risk factor over the number of people with the disease who were

not exposed. It is a way of comparing whether the probability of a certain event is the same for two groups. An odds ratio of 1 implies that the event is equally likely in both groups; an odds ratio greater than one implies that the event is more likely in the first group. An odds ratio less than one implies that the event is less likely in the first group. Case-control studies use OR.

P value: when statistical analysis of the study data differs between the control and experimental group or the before-and-after treatment group finds a P value greater than .05 (5%), the difference is considered non-significant. In order to have significant results, the p value must be less than 5% (.05), meaning the results were not just due to chance.

Periodontal disease: periodontal diseases are caused by chronic gram-negative micro-organisms that accumulate in plaque biofilms and result in the inflammatory destruction of the structures of the periodontium, including the periodontal ligament, cementum, alveolar and supporting bone. These diseases result from exposure of the periodontium to dental plaques, biofilms that accumulate on the teeth. The inflammation around the tooth may allow micro-organisms or their products, including lipopolysaccharides, peptidoglycan fragments, and hydrolytic enzymes, into the systemic circulation. The host response to periodontal infections results in the local production of cytokines and biological mediators including interleukins and prostaglandins as well as the introduction of serum antibodies.³³

Prospective study: a study where information on an exposure of interest is used to compare eventual outcomes.

Randomized controlled trial (RCT): the strongest experimental design in which subjects are randomly assigned to treatment groups, with one group being a control group. The RCT provides the most powerful research evidence and can show causality.

Relative risk factor (RR): measurement of how much a particular risk factor influences the risk of a particular outcome. A relative risk of 2 means that a person has a two-fold increased risk of having a particular outcome. Cohort studies use RR.

Retrospective study: a study that begins with an outcome and investigates back for exposure information.

Systemic disease: a disease that affects the whole body

Therapeutic seeding: within the context of a diabetic client, it refers to a clinician's discussion with a pre-symptomatic client regarding his or her susceptibility to diabetes and suggestions for life style changes that include exercise, weight loss or control, and knowledge of risk factors.

APPENDIX B

Canadian Task Force on the Periodic Health Examination Evidence Classification Scheme

Levels of evidence*

- I: Evidence obtained from at least one properly randomized controlled trial.
- II-1: Evidence obtained from well-designed controlled trials without randomization.
- II-2: Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one centre or research group.
- II-3: Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category.
- III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

* Criteria developed by the Canadian Task Force on the Periodic Health Examination. Goldbloom R, Battista RN. The Periodic Health Examination: 1. Introduction. *CMAJ* 1986; 134(7):721-3.

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APPENDIX C

Three levels of oral disease prevention for the diabetic client

Hein* suggests the following three levels of prevention for clients with diabetes or at risk of developing diabetes:

- Primary prevention, which is aimed at pre-symptomatic yet susceptible individuals and includes health promotion and therapeutic seeding.
- Secondary prevention includes early diagnosis and screening for type 2 diabetes using glucometers at the chairside, for clients considered by history and clinical findings to be at risk for diabetes. This suggestion is of particular importance, given the suggestion by Lamster and Lalla** that some patients are seen in their dentist's office on a more regular basis than they are seen in a physician's office.
- Third level prevention (or tertiary prevention) is rehabilitation of the chronic diabetic client, including minimizing the loss of periodontal support.

* Hein C. Getting it right in long-term management of chronic periodontitis associated with diabetes, Part 1. *Contemporary Oral Hygiene*. 2003;3(9): 24-31.

** Lamster IB, Lalla E. Periodontal disease and diabetes mellitus: discussion, conclusions, and recommendations. *Ann Periodontol*. 2001;6: 146-49.

APPENDIX D

Oral procedures creating risk of bacteremia^{58,59}

The following is a list of oral procedures that create a risk for bacteremias: periodontal treatment and prophylactic cleaning of teeth or implants where bleeding is anticipated, periodontal surgery, scaling, root planing, probing, recall maintenance, initial placement of orthodontic bands but not brackets, intraligamentary local anesthetic injections, oral irrigators or air abrasive polishing devices, dental extractions, implant placement and tooth reimplantation, endodontic surgery or instrumentation beyond the root apex, and subgingival placement of antibiotic fibers or strips.

Cardiac conditions requiring prophylaxis for dental treatment^{59,60}

High risk

- Prosthetic cardiac valves, including bioprosthetic and homograft valves.
- Previous infective endocarditis, even in the absence of heart disease.
- Complex congenital cardiac malformations (e.g., single ventricle states, transposition of the great arteries, tetralogy of Fallot).
- Surgically constructed systemic/pulmonary shunts.

Moderate risk

- Rheumatic and other acquired valvular dysfunction even after valvular surgery.
- Hypertrophic cardiomyopathy.
- Mitral valve prolapse with valvular regurgitation and/or thickened leaflets
- Non-complex congenital cardiac malformations.

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"EVOLUTION" (continued from page 99)

our practitioners. If you have ideas for research projects, we encourage you to look for areas of support within your province and community. We must ensure that the public understands and supports the dental hygiene profession's push to use evidence-based practice standards.

Baccalaureate degree

The increased amount of knowledge that dental hygiene students need to graduate and practise to their fullest abilities reinforces the need for the baccalaureate level of educational recognition throughout the country. Along with this is the increased opportunity for degree completion by practising

dental hygienists. The public needs to understand the full scope of practice of dental hygienists so we must be aware of opportunities to promote our role in oral health.

Underserved populations

As we continue to increase our body of knowledge and recognize the services of the profession, we also identify the underserved areas and populations. For many dental hygienists, the clients they see in daily practice have well-maintained dentition (or at least are well on their way) and relatively good oral health. However, there is a huge segment of the population who do not enjoy this level of oral health, for a variety of reasons. This brings us again to the need to educate the public and gain their support for unrestricted access to dental hygiene services for all people of Canada.

We encourage you to get involved in the promotion of our profession. I hope to see many of you in June 2004 at the CDHA Annual Conference—"Beyond the Tip of the Iceberg, a Sea of Opportunity"—in St. John's, Newfoundland and Labrador.

Patty Wickstrom can be reached at <president@cdha.ca>.

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à jour et d'anticiper les services d'hygiène dentaire pour l'avenir. Salme Lavigne et Judy Lux ont recueilli et interprété des données concernant les liens entre la santé bucco-dentaire et la santé en général — leur étude est d'ailleurs publiée dans l'édition d'aujourd'hui de *Probe*. Je vous encourage à lire cet article et à en intégrer l'information dans votre pratique. Vous êtes invitées à communiquer vos réactions et vos commentaires au bureau de l'ACHD. Alors que nous nous acheminons vers une pratique fondée sur des données probantes, nous avons besoin de plus de recherches et de données pour soutenir nos praticiennes. Si vous avez des idées de projets de recherche, nous vous encourageons à chercher des domaines où vous pourriez trouver des appuis dans votre province et votre collectivité. Nous devons faire en sorte que le public comprenne et appuie la poussée de la profession de l'hygiène dentaire vers l'utilisation de normes de pratiques fondées sur des données probantes.

Baccalauréat

L'accroissement de connaissances dont les étudiantes en hygiène dentaire ont besoin pour obtenir leur diplôme et pratiquer au meilleur de leurs capacités renforce le besoin, partout au pays, d'une reconnaissance au niveau du baccalauréat. En même temps, les hygiénistes dentaires en exercice peuvent maintenant plus facilement compléter leur diplôme. Le public a besoin de comprendre la pleine portée de la pratique des hygiénistes dentaires, de sorte que nous

devons être conscientes des occasions offertes pour promouvoir notre rôle dans le domaine de la santé bucco-dentaire.

Populations sous-desservies

Alors que nous continuons à augmenter notre corpus de connaissances et à reconnaître les services de la profession, nous identifions aussi les régions et les populations insuffisamment desservies. Pour beaucoup d'hygiénistes dentaires, les clients rencontrés dans leur pratique quotidienne ont une dentition bien entretenue (ou du moins en bonne voie de l'être) et une santé bucco-dentaire relativement bonne. Toutefois, il y a un large segment de la population qui ne bénéficie pas de ce niveau de santé bucco-dentaire, pour une variété de raisons. Cela nous ramène, une fois encore, à la nécessité d'éduquer le public et d'obtenir son appui pour travailler à assurer un libre accès aux services d'hygiène dentaire pour tous les habitants au Canada.

Nous vous enjoignons de participer à la promotion de notre profession. J'espère vous voir en grand nombre en juin 2004, à la Conférence annuelle de l'ACHD sous le thème « Beyond the Tip of the Iceberg, a Sea of Opportunity », à St. John's (Terre-Neuve et Labrador).

On peut rejoindre Patty Wickstrom à l'adresse <president@cdha.ca>. 

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LETTERS TO THE EDITOR

ACCESS ANGST

March 16, 2004

Dear Editor:

Thank you for your feature article in the Nov/Dec 2003 issue of *Probe* entitled "Access Angst," in particular the section dealing with rural, northern and Aboriginal communities. I was glad to see an article that discussed the incredible need for dental services in these areas and some of the difficulties faced when trying to provide those services.

Practicing in a general dentistry clinic in a community in northern Saskatchewan that is largely Aboriginal has been, and continues to be, very demanding. As your article indicates, the general state of oral health is not good. In fact, some days, the extent and severity of the dental and periodontal disease is very similar to what I have seen while working in rural Guatemala. To see third-world conditions here in Canada has been quite an eye-opening experience.

The need for dental services in remote northern communities is tremendous. I hope that making more dental professionals aware of this will translate into caring and concern, and a willingness to take on the challenges of providing care to people who really need it.

Sincerely,

Sheila Fujimagari, RDH, BSc

NUTRITION

March 26, 2004

Greetings:

I was thrilled to see Nutrition as the topic for the Jan/Feb issue of *Probe* as it is one of my favorite topics. I totally agreed with Linda Maschak in her editorial when she said, "dental hygienists need to keep current with nutrition research and policy" and "dental hygienists should attend interdisciplinary courses or conferences on nutrition." I was disappointed, however, when I read most of the articles.

With the exception of the "Herbal Medicine and Vitamin/mineral Supplements" article, most submissions were basic and didn't really inform hygienists about anything that they shouldn't already know. The article that troubled me the most, however, was the one entitled, "Adolescent Diets and Oral Health."

In this article, it was stated at least three times that with a shortage of vitamin D and calcium in the system, "teeth may soften and become more susceptible to decay." We were taught that following adolescence, the teeth are fully formed and a shortage of calcium in the diet does not affect the teeth (unlike the bones). Has there been recent research to support this notion? If so, please let me know where I can find it.

Thank you for your time and your reply:

Sincerely,

Rita Chu, DipDH, BDSc

AUTHOR'S RESPONSE

Patricia:

I can understand the confusion to some extent. I am not sure how extensively biochemistry and metabolism is covered in the dental hygiene curriculum.

First of all, I thought you did a fantastic job focusing all the articles on nutrition throughout the life span, and including more alternative topics such as herbal nutrition, trendy diet and eating disorder topics, which are big right now due to the prevalence of obesity in North America.

Teeth mineralization continues into late adolescence (and my article focused on adolescence). So, as we all know, vitamin D plays a crucial role in the absorption of calcium into the teeth, along with other minerals. Not having vitamin D and the proper minerals during the building stages would compromise the mineralization stages of the teeth (including roots), resulting in weak/soft teeth that is prone to decay.

The reader can go to <www.adha.org/CE_courses/course7/nutritional_factors.htm> [web site of the American Dental Hygienists' Association] to read the following paragraphs:

"The mineralization process begins as early as four months of gestation and continues into late adolescence as the root structures are completed. Once the teeth have erupted, diet and nutrient intake continue to affect permanent tooth development and mineralization, enamel development and strength....

Once teeth are fully formed [post-adolescent], there is little change in their composition throughout life. Unlike bone tissue, teeth do not readily release minerals, such as calcium or phosphorus, when the body's need for these minerals are not met by the diet."

However, my article was dealing with adolescence, not post adolescence.

That is the context of the phrase in my article that "teeth may soften when there is a shortage of vitamin D and become more susceptible to decay and periodontal disease." It is within the context of adolescence, during the late building stages of teeth.

There is a new study in October 15, 2001 in American Journal of Medicine (Krall EA, et al) that shows correlations in adults between taking calcium and vitamin D and losing fewer teeth. This is fairly new and could indicate benefits of vitamin D past adolescence into late life stages.

Hope this helps,

Charlene Chen

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1. Harris M, Mackay H, et al, Effectiveness of Johnson & Johnson REACH® Clean Burst™ vs. GLIDE® Mint Floss in Reducing Plaque, Journal of Dental Research, Vol. 82, Special Issue B, June 2003.
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DES HYGIÉNISTES DENTAIRES

Human Resources (HHR) Strategy, a collaboration of federal, provincial, and territorial governments. This Strategy aims to strengthen the evidence base for national HHR planning; to improve recruitment and retention; and to promote interprofessional education for collaborative patient-centred practice (IECPCP). The third goal is amplified in a quote from the National Stakeholders' Workshop:

"Collaborative patient-centred practice is a way of health care professionals working together and with their patients. Two or more disciplines continuously interact in a common effort to explore or solve shared issues with the optimum participation of the patient. Collaborative patient-centred practice promotes the active participation of each discipline in patient care. It optimizes staff participation in clinical decision-making within and across disciplines, and fosters respect for all professionals. In addition, it enhances patient and family-centred goals and values and facilitates continuous communications among caregivers."¹

1. From "InterProfessional Education for Collaborative Patient-centred Practice," Health Canada's Health Human Resources Initiative Backgrounder. Ottawa: Health Canada, March 2004.

Idealistic or workable? How can this actually come about? This is what the project will explore through its three objectives that aim to:

- promote and demonstrate the benefits of IECPCP;
- increase the number of health professionals trained for patient-centred interprofessional team practice at the levels of entry into practice, graduate education, and continuing education; and
- stimulate networking and sharing of best educational practices for collaborative patient-centred practice.

Although the following web sites were not yet active when I wrote this editorial, check <www.health_human_resources.ca> or <www.ressources_humaines_en_sante.ca> for more information on this initiative.

Dental hygienists have been known for many years in smaller interprofessional circles as committed partners in maintaining clients' health. We will participate actively in this project to ensure that dental hygienists are respected for their contribution to the overall wellness of Canadian citizens. 

"BEAUCOUP PLUS QUE LA SOMME DES PARTIES" (suite de la page 103)

Grâce aux travaux des commissions d'enquête Romanow et Kirby, les soins de santé et leur accessibilité pour tous les Canadiens ont maintenant fait les manchettes pendant quelques années. En se fondant sur les conclusions de ces commissions, l'Accord des premiers ministres sur le renouvellement des soins de santé signé en 2003 a souligné la nécessité pour les Canadiens d'avoir accès aux dispensateurs de soins de santé, aujourd'hui comme demain. Un des résultats de l'Accord, c'est la Stratégie nationale des ressources humaines en santé (RHS), issue de la collaboration des gouvernements fédéral, provinciaux et territoriaux. Cette stratégie vise à renforcer les données sur lesquelles s'appuie la planification nationale des RHS, à améliorer le recrutement et la rétention, et à promouvoir l'éducation interprofessionnelle en vue d'une pratique coopérative centrée sur le client. Ce dernier but est amplifié dans la citation suivante tirée de l'atelier national sur les intervenants :

« La pratique coopérative centrée sur le patient est une façon, pour les professionnels des soins de santé, de travailler étroitement avec leurs patients. Deux ou plusieurs disciplines interagissent dans un effort commun pour explorer ou résoudre des problèmes partagés, avec la participation optimale du patient. La pratique coopérative centrée sur le patient fait la promotion de la participation active de chacune des disciplines en présence dans les soins au patient. Elle optimise la participation du personnel dans la prise de décision clinique au sein d'une discipline donnée et à travers les multiples

disciplines; et favorise le respect à l'égard de tous les professionnels. En plus, elle valorise les buts et les valeurs centrés sur le patient et la famille; et facilite des communications continues entre les pourvoyeurs de soins. »¹

Idéaliste ou réalisable ? Comment ces souhaits peuvent-ils devenir réalité ? C'est ce que le projet va explorer à travers ses trois objectifs qui visent à :

- promouvoir et démontrer les avantages de l'éducation interprofessionnelle en vue d'une pratique centrée sur le patient ;
- augmenter le nombre de professionnels de la santé formés en vue d'une pratique d'équipe interprofessionnelle centrée sur le patient — aux niveaux de l'entrée dans la pratique, de l'éducation menant au diplôme et de l'éducation permanente ;
- stimuler le réseautage et le partage des meilleures pratiques éducatives pour une pratique coopérative centrée sur le patient.

Même si les sites Web suivants n'étaient pas encore en activité lorsque j'ai rédigé cet éditorial, allez y jeter un coup d'œil : <www.health_human_resources.ca> ou <www.ressources_humaines_en_sante.ca> pour en apprendre davantage sur cette initiative.

Dans les petits cercles interprofessionnels, les hygiénistes dentaires sont connues depuis plusieurs années comme des partenaires engagées dans le maintien de la santé des clients. Nous participerons activement à ce projet pour faire en sorte que les hygiénistes dentaires soient respectées pour leur contribution au bien-être général des Canadiennes et des Canadiens. 

1. Tiré de "InterProfessional Education for Collaborative Patient-centred Practice," document d'information sur l'Initiative de ressources en santé humaine de Santé Canada", Ottawa, Santé Canada, mars 2004.

Modern Dentistry in the Land of The Midnight Sun



The Adam Dental Clinic

The Adam Dental Clinic has been serving the city of Yellowknife and the communities of the Northwest Territories since 1987.

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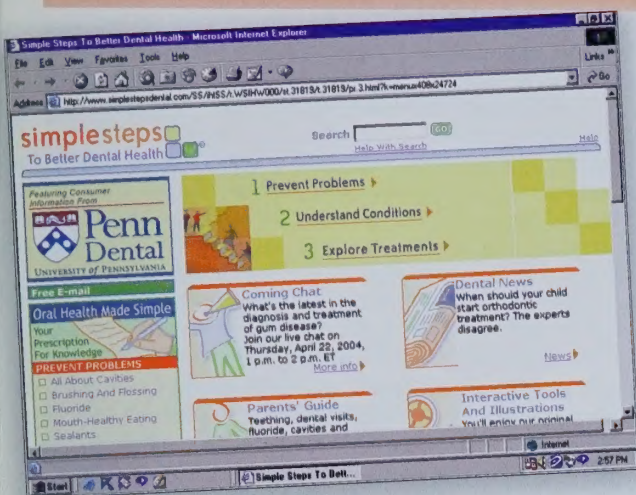
The clinic is located in the downtown core of Yellowknife, within walking distance of most businesses and only minutes away from untouched wilderness. Our northern city is compact with all amenities, entertainment, sport, and cultural features. It is also home to a thriving tourist industry catering to those who wish to experience the northern wilderness, to view our spectacular northern lights in the winter, or to enjoy our 24-hour summer sun. Yellowknife is a young, modern city with an incredible future.

For more information, call Krista Sansom at 867-873-2775 or fax your résumé to her attention at 867-920-2775.

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PROBING THE NET

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by CDHA Staff

Our conscientious author of "Probing the Net" over the past seven years is taking a well-earned rest from this column. Karen Wolf has been providing readers with all levels of computer literacy, clinical experience, academic and research focus with web sites of interest to the practising dental hygienist, the educator, the public health worker. Karen's hard work has helped us all improve our Internet skills and she is to be commended for her dedication.

Internet research is a strong area at CDHA with our information consultant assisting our health policy communications specialist with research for papers such as *Access Angst*, *Fluoride Dialogue*, and the position paper in this issue, *Your Mouth – Portal to Your Body*. We are on the Internet many hours a day and come across both general and specialized sites that would be thought-provoking for dental hygienists. We believe an annotated column such as this helps readers and we are pleased to be able to continue the column.

Here are some valuable portal sites that are good and reliable sources of information.

Health Web

www.healthweb.org/browse.cfm?subjectid=34

This site, supported by the U.S. National Library of Medicine, focuses on U.S. resources but could be a source of information for dental hygienists. There are many areas to explore such as consumer health resources, continuing education, educational resources, and electronic journals.

Oral Health in America: A Report of the Surgeon General

www.surgeongeneral.gov/library/oralhealth/

Many references are made to this prominent report of May 2000 by the U.S. Surgeon General. This link will enable you to access the executive summary and to download the entire report in HTML or PDF. It makes for enlightening and sobering reading.

Intelihealth Dental

<http://www.simplestepsdental.com/SS/ihtSS/r.WSIHW000/st.31819/t.31819/pr.3.html?k=menux408x24724>

This site, with information provided by the University of Pennsylvania, focuses on consumers and is a good site for your clients to look at. Sections and subsections include Preventing Problems (All about Cavities, Brushing and Flossing, Fluoride, Sealants), Conditions (Bad Breath, Cavities, Cold Sores, Dry Mouth, Tooth Discoloration), Treatments (Scaling, Whitening), General Topics (Controlling Pain, Dental Medications, Diseases and Oral Health, Kids and Teens).

MEDLINEplus Health Information – Mouth and Teeth Topics

www.nlm.nih.gov/medlineplus/mouthandteeth.html

A large, comprehensive, and respected site dealing with topics such as child dental cleft lip and palate, cosmetic dentistry, mouth disorders, oral cancer, gum disease, salivary gland disorders, tooth disorders—and that is before you get into the section on dental health with its information on nutrition, prevention and screening, research, specific conditions, treatment, as well as statistics, relevant organizations and directories.

Hardin MetaDirectory (Hardin Library for the Health Sciences, University of Iowa)

www.lib.uiowa.edu/hardin/md/dent.html

A portal site giving access to large and medium sized lists of dental resources plus a large selection of sites with pictures of oral diseases.

NIDCR (National Institute of Dental and Craniofacial Research)

www.nidcr.nih.gov

This institute, one of the U.S. National Institutes of Health, provides a wealth of information arranged in categories such as Health Information, Clinical Trials, Research, News and Reports. Under Health Information is an Oral Health Information Index with extensive listings of on-line information available from the Institute and other agencies. Topics include as AIDS/HIV, Cancer Treatment and Oral Health, Children's Oral Health, Diabetes, Dry Mouth, Fluoride, Gum (Periodontal) Diseases, Oral Cancer, Saliva and Salivary Gland Disorders, Tooth Decay (Caries) and Cavity Prevention.

Other web sites for research and specific and general information are listed on CDHA's web site at <www.cdha.ca/members/content/research/research.asp> and click on Research Resources. As Karen said, "Until next time..."

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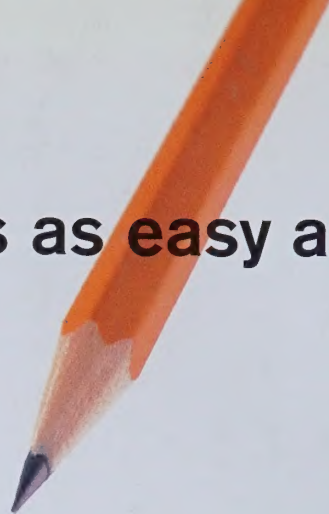
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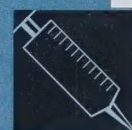
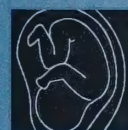
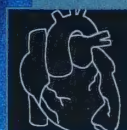
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Your Mouth

— Portal to Your Body



Canadian Dental Hygienists Association
Position Paper on the Links
between Oral Health and
General Health: Part II

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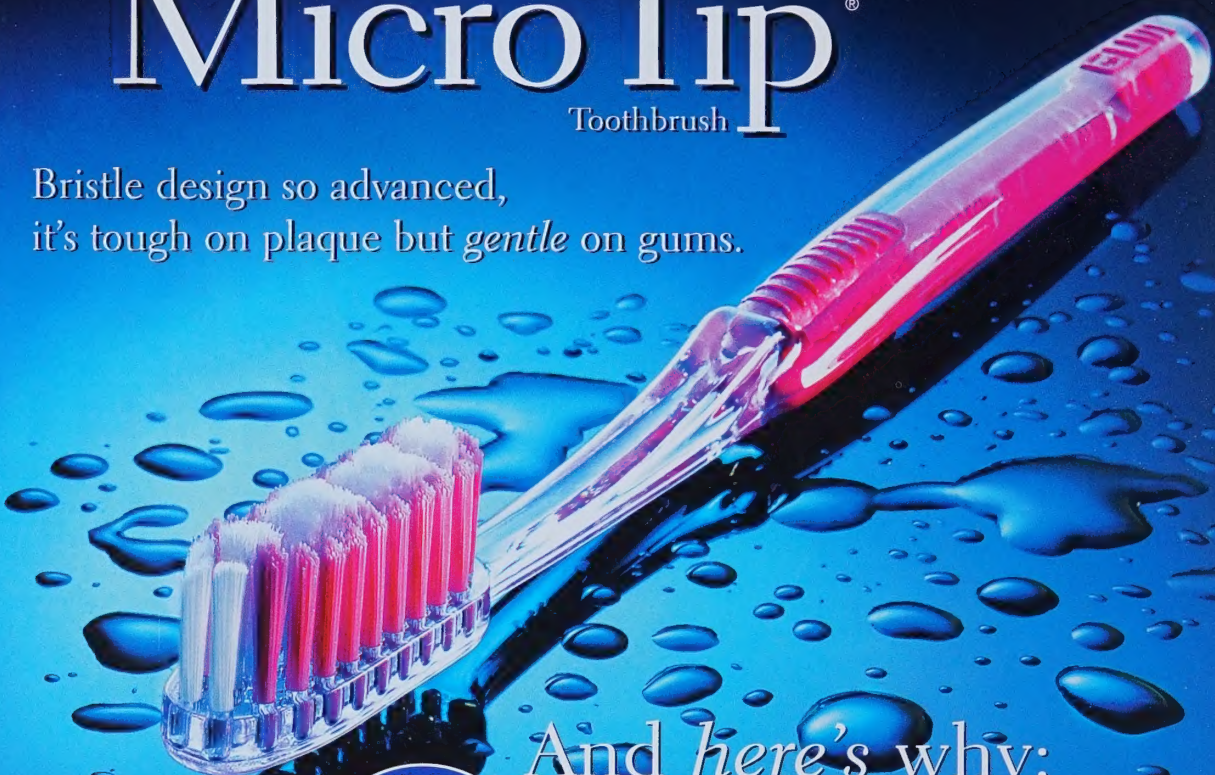
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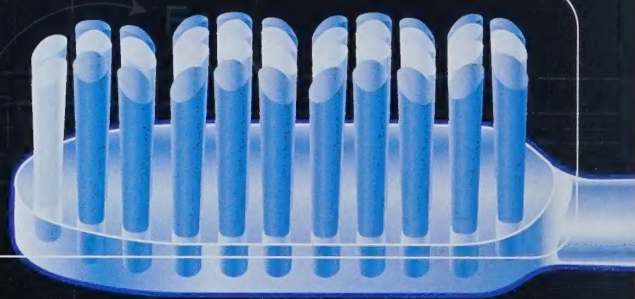
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* Reynolds, H.S. and Zambon, J.J. Microbiological and Clinical Alterations
From Using Butler "GUM" Toothbrushes. J Dent Res 76, Abstract #1753, 1997.

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HEALTHY GUMS. HEALTHY LIFE.™

Volunteering

by Patty Wickstrom

Volunteering in Canada has been around since the 1600s and is still strong in today's world. People volunteer for many different reasons, from personal interest to professional empowerment. Where they volunteer is just as varied, from humanitarian causes to professional associations.

Janet Lautenschlager's report for Canadian Heritage, "Volunteering: A Traditional Canadian Value," states that "the spirit of volunteerism is rooted in the traditions and values of the pioneers who built this country, and it is inspired by the concept of mutual help and co-operation." She emphasizes the importance and breadth of the donation of time and energy to the Canadian community:

"Over the years, volunteering has mobilized enormous energy for the common good. While the direct effects of volunteer work are felt at individual or community level, the cumulative action of many millions of ordinary citizens from every region of the country has had a profound impact on virtually every aspect of Canadian society—and has, in fact, fostered its growth and development.

Dental hygienists have many opportunities for volunteer work

"Volunteers are ordinary citizens who have chosen to become involved in providing a needed service, solving a problem, or advancing a worthy cause. Recognizing a particular need in society, they make the effort to translate ideas into reality without the thought of payment."

The need for volunteer services has changed with the times, as has the role that these services play. At the beginning of European settlement in North America, Aboriginal peoples helped the newcomers survive by teaching them what worked in the harsh Canadian environment, for example, canoes and snowshoes for transportation, natural remedies for diseases such as scurvy, and native vegetables such as corn and pumpkins. Most of the earlier social service organizations were developed and run by churches in Canada. Many different volunteer organizations have assisted in times of disaster and famine and have made new immigrants



Le bénévolat

par Patty Wickstrom

Le bénévolat se pratique au Canada depuis le XVII^e siècle et il y est toujours vigoureux de nos jours. Bien des raisons, allant de l'intérêt personnel au renforcement de l'autonomie professionnelle, poussent les gens à faire du bénévolat. Depuis les causes humanitaires jusqu'aux associations professionnelles, le cadre choisi par les bénévoles pour exercer leurs activités est tout aussi varié.

Les hygiénistes dentaires ne manquent pas d'occasions de faire du bénévolat

Dans une publication préparée pour Patrimoine canadien – *Le bénévolat : une valeur traditionnelle au Canada* –, Janet Lautenschlager déclare : « L'esprit du bénévolat est ancré dans les traditions et les valeurs des pionniers qui ont bâti ce pays et s'inspire de l'attitude d'entraide et de collaboration. » Elle souligne l'importance et l'ampleur du temps et de l'énergie mis gracieusement au service de la collectivité canadienne :

Au fil des ans, le bénévolat a mobilisé une énergie considérable pour assurer le bien commun. Bien que les effets directs du bénévolat se fassent sentir au niveau individuel ou communautaire, l'action cumulative de millions et de millions de citoyens ordinaires de toutes les régions du pays a eu une incidence profonde sur pratiquement chaque aspect de la société canadienne – et a, en fait, favorisé sa croissance et son développement.

Les bénévoles sont des citoyens ordinaires qui ont choisi de faire leur part pour répondre à un besoin pressant, résoudre un problème ou faire avancer une cause louable. Reconnaissant qu'il existe un besoin particulier dans la société, ils s'efforcent de transposer les idéaux dans la réalité sans songer à en tirer une récompense. [sic]

Le besoin de services de bénévolat a évolué avec le temps; le rôle que jouent ces services également. Au début de la colonisation européenne en Amérique du Nord, les Autochtones ont aidé les nouveaux venus à survivre en leur enseignant des pratiques adaptées au rude milieu canadien – par exemple, l'utilisation du canot et des raquettes pour le transport, des remèdes naturels pour des maladies comme le scorbut et des légumes indigènes tels que le maïs et la

147

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1. Volpe AR, et al. J Clin Dent. 1996; 7 (suppl): S1-S14. 2. Data on file, Colgate-Palmolive Company. 3. Ayad f, et al. Clinical efficacy of a new tooth whitening dentifrice. J Clin Dent. 2002; 13:82-85. 4. Singh S, et al. The clinical efficacy of a new tooth whitening dentifrice formulation: A six-month study in adults. J Clin Dent. 2002; 13:86-90.

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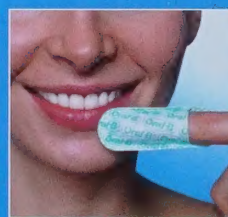
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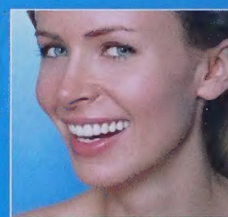
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MESSAGE DE LA DIRECTRICE GÉNÉRALE

Involvement

by Susan Ziebarth,
BSc, MHA, CHE

The course of history was altered at Juno Beach and along the Normandy Coast on June 6, 1944. We must honour what happened here. We must always remember.

— Jean Chrétien at Juno Beach, France, June 6, 2003

Two news items are receiving the lion's share of attention as I write this. The 60th anniversary of D-Day is the first; the second is our upcoming federal election. A few thoughts on both of these issues and also on the profession of dental hygiene...

Sixty years ago, young men fought and many died to give us the freedom to make the choices we do today. Many women were also heroes as they nursed the young wounded men. Both soldiers and nurses must have been afraid, but their work was crucial so they were proud to do it despite the personal sacrifices involved.

Today, when life moves so quickly and the world is much smaller because of our communication and travel capabilities, I think we can forget, or perhaps cannot comprehend, the magnitude of what was done on our behalf.

As a young dental hygienist, are you involved in your profession?

Meanwhile, the daily election news seems to be about non-issues that opponents try to blow up into major scandals. Key political issues are avoided in case a public debate ensues that might alienate a part of the voting public. A restaurant server in the Maritimes made a telling remark this morning that her customers "didn't trust one party, were scared of another, and might vote for the third just because it was the only other option." This is a sad commentary on a country built by so much hard work by its citizens. Perhaps the best standard bearer of Canadian pride in the news today is the Calgary Flames...not Calgary's team anymore, but Canada's.

Sixty years ago the youth of this country saved this country. Where are the youth of today? Overall voter participation is declining, that of the youngest voters falling from 38.2 per



L'engagement

par Susan Ziebarth,
BSc, MHA, CHE

Le cours de l'histoire s'est infléchi à Juno Beach et le long de la côte de Normandie à partir du 6 juin 1944. Il faut rendre hommage aux événements qui se sont déroulés ici. Il ne faut jamais oublier.

— Jean Chrétien à Juno Beach, France, le 6 juin 2003

Dans les nouvelles de cette semaine, deux sujets mobilisent l'attention : d'abord le 60^e anniversaire du jour J et ensuite les prochaines élections fédérales. Voici quelques réflexions sur ces deux questions... ainsi que sur la profession d'hygiéniste dentaire.

Il y a soixante ans, des jeunes gens ont combattu et nombre d'entre eux ont péri pour qu'aujourd'hui nous ayons la liberté de faire des choix. Un grand nombre de femmes qui soignaient les jeunes blessés se sont également comportées en héroïnes. Tous, infirmières et soldats, ont certainement connu la peur, mais comme leur travail était essentiel, ils l'ont accompli avec fierté, sans s'arrêter à leurs sacrifices personnels.

De nos jours, il est possible que l'ampleur des gestes accomplis en notre nom nous échappe ou que nous ayons tendance à l'oublier : la vie se déroule si rapidement et nos moyens de communication et de transport ont tellement réduit les dimensions du monde!

Vous, les jeunes hygiénistes dentaires, vous intéressez-vous de près à votre profession?

Pendant ce temps, les nouvelles quotidiennes au sujet des élections semblent porter sur de faux problèmes que les opposants tentent d'amplifier en grands scandales. Les candidats évitent d'aborder les dossiers politiques fondamentaux de crainte d'enclencher un débat public qui pourrait leur aliéner une partie de l'électorat. Une serveuse de restaurant des Maritimes faisait ce matin une remarque révélatrice : « Mes clients, disait-elle, se méfient d'un des partis, ont peur de l'autre et pourraient bien voter pour le

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feel welcome. The YMCA and YWCA, developed in the mid-1800s, promote the health and well-being of young people and continue their work today. During the war years, members of the Canadian Red Cross and the St. John Ambulance volunteered numerous hours with wounded soldiers returning from the front. The examples go on and on.



The work of many early volunteer organizations has now been taken over by government (social welfare is a good example), but new organizations are initiated every day to address new concerns.

Dental hygienists have many opportunities for volunteer work. Whether for the public, for personal causes, or for the profession, it is important to get involved. The CDHA relies on volunteers to help move the profession forward. The annual conference enlists the aid of members from the host location to bring together the successful conferences in which we have all

been able to participate. The dental hygienists' local societies and provincial and national associations are generally chaired by a volunteer board/council as are the various committees within these organizations. Dental hygiene educators volunteer many hours outside of the regular teaching day to make sure the students are well educated when they graduate.

In the community with its huge underserved populations, there are countless opportunities for volunteer work. I encourage you to investigate the opportunities available in your area.

This past March, I was fortunate to be able to join the Kindness in Action team in Guatemala, providing dental hygiene services in an area with no access to dental care. Many of the people walked up to three hours to obtain limited services that most Canadians take for granted. The gratitude of our clients was more than enough reward.

Evidently 20 per cent of Canadians volunteer in one way or another but that leaves 80 per cent of the population who could help. Volunteers are dedicated to meeting the needs of others. These needs may change over the years and take on new forms but the willingness to volunteer has always been a fundamental Canadian value. If you are part of the 20 per cent, I applaud you. If you are not, what is holding you back?

Patty Wickstrom can be reached at <president@cdha.ca>.

Volunteering with Kindness in Action in Guatemala

Bénévoles au Guatemala, dans le cadre de Kindness in Action

"L'ENGAGEMENT" (suite de la page 147)

citrouille. Au Canada, la plupart des premiers organismes de service social ont été mis sur pied et gérés par les Églises. Une foule d'organismes de bénévolat divers ont apporté leur appui en temps de désastre et de famine et ont aidé les immigrants à se sentir chez eux. Le YMCA et le YWCA, qui ont pris leur essor au milieu du XIX^e siècle, font la promotion de la santé et du bien-être chez les jeunes et poursuivent leur œuvre de nos jours. En temps de guerre, les membres de la Croix-Rouge canadienne et de l'Ambulance Saint-Jean ont consacré des heures et des heures de bénévolat aux soldats blessés qui revenaient du front. Les exemples sont innombrables.

L'œuvre de nombreux organismes de bénévolat des premières heures est désormais prise en charge par l'État (l'aide sociale en constitue un bon exemple), mais de nouveaux organismes sont mis sur pied tous les jours pour faire face aux nouveaux problèmes.

Les hygiénistes dentaires ne manquent pas d'occasions de faire du bénévolat. Or, il est important de s'investir, que ce soit au profit du public, de causes personnelles ou de la profession. L'ACHD compte sur des bénévoles pour l'aider à faire progresser la profession. La conférence annuelle fait appel à l'aide de membres de la localité hôte pour l'organisation des conférences auxquelles nous avons tous et toutes pu participer. Les sociétés locales et les associations provinciales et nationales d'hygiénistes dentaires sont habituellement présidées par un conseil de bénévoles, tout

comme les divers comités internes de ces organismes. Les enseignants en hygiène dentaire ne comptent plus les heures de bénévolat qu'ils assument en plus des heures normales d'enseignement pour faire en sorte qu'au moment d'obtenir leur diplôme, leurs élèves aient reçu la meilleure formation possible.

Dans la société, où quantité de populations sont mal servies, les possibilités de bénévolat abondent. Je vous encourage à examiner de près celles qui existent dans votre région.

En mars dernier, j'ai eu la chance de pouvoir me joindre à l'équipe de Kindness in Action, au Guatemala, pour fournir des services d'hygiène dentaire dans une région qui n'a pas accès à ce type de soins. Nombreux sont ceux et celles qui marchaient jusqu'à trois heures pour obtenir des services limités que la plupart d'entre nous tenons pour acquis. La gratitude de nos clients a été une récompense plus que suffisante.

De manière évidente, 20 % des Canadiens et des Canadiennes font du bénévolat d'une façon ou d'une autre; c'est dire que 80 % de la population pourrait encore apporter son aide. Les bénévoles se dévouent pour répondre aux besoins d'autrui. Ces besoins peuvent évoluer au fil des ans et revêtir de nouvelles formes, mais la disposition au bénévolat a toujours été une valeur canadienne fondamentale. Si vous faites partie des 20 %, je vous en félicite; sinon, qu'est-ce qui vous retient?

On peut joindre Patty Wickstrom à l'adresse <president@cdha.ca>.



Canadian Advisory Board on Dentin Hypersensitivity

Dentin Hypersensitivity

Taking the Pain Seriously

The high prevalence of dentin hypersensitivity, combined with continued underreporting and underdiagnosis, has intensified the need to focus on the management of this condition. Responding to that need, the Canadian Advisory Board on Dentin Hypersensitivity, a committee representing a broad range of dental care specialties, convened to determine best-practice recommendations.¹ Collectively, they evaluated the scientific evidence as well as condition-related knowledge gaps that were identified by an extensive national survey of 8,000 dental professionals (7% response rate). By contributing their own diverse expertise, the committee produced the first ever "Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity," to provide direction to the dental care profession.



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"Unreported" pain does not mean "unimportant" pain

The pain of an aching tooth still propels patients to the dentist's chair faster than any other complaint. With pain as such a powerful driving force, the pain of dentin hypersensitivity is surprisingly underreported. The dichotomy of the condition's high prevalence and the lack of patient acknowledgement is a challenge to comprehend, and has increasingly garnered attention in the academic dental community. It is hypothesized that many patients with dentin hypersensitivity assume their condition is a natural occurrence developing with age and that it is therefore untreatable. They may also perceive the pain as trivial due to its intermittent or transient nature. For these reasons, the Canadian Advisory Board emphasized that communicating with patients about the pain of dentin hypersensitivity is important and should be encouraged by dental care professionals – even if patients may not present with this condition as a chief or initial complaint.

While relieving unnecessary suffering is of utmost importance, and concern for patient satisfaction is always a professional goal, research indicates that all pain needs to be treated diligently. If left untreated, pain elicits specific physiological responses that further increase its intensity and extent.² Dentin hypersensitivity "satisfies all the criteria to be classified as a true pain syndrome", and therefore needs to be treated accordingly.³ Dentin hypersensitivity presents as a short, sharp pain arising from exposed dentin in response to stimuli – typically thermal, evaporative, tactile, osmotic or chemical – that cannot be ascribed to any other form of dental defect or disease. For many patients, this acute pain is recurrent and, for some, it is severe enough to affect normal oral hygiene and eating behaviour. Even gentle brushing or ingestion of certain foods can trigger or exacerbate this pain condition. Pain presenting as dentin hypersensitivity requires greater attention; it should and can be treated, and it should never be considered trivial.

New recommendations appeal to the dental profession for an attitude change

The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience arising from actual or potential tissue damage..."² The definition itself highlights the reason pain assessment can present a challenge to the dental or medical professional. The assessment of pain cannot rely totally on the presence or absence of visible lesions, because the relationship between physical disease and the intensity of pain is not always straightforward.² To confound the challenge even more, pain is a complex and subjective perception, uniquely experienced by each individual. It can be assessed

only indirectly, based on the patient's overt communication, both verbal and behavioural. Eliciting descriptions of pain from the patient in terms of intensity, quality, time-course, impact and personal meaning can be particularly difficult.

The Canadian Advisory Board on Dentin Hypersensitivity acknowledges that dental, and even medical professionals' training in the diagnosis and management of chronic pain is limited and offers little preparation for the complexities of assessment and counseling. Dentin hypersensitivity is a painful condition subject to these complexities. For this reason, the board identified a list of recommendations for the dental profession's development in the area of pain. They concluded that dentistry needs to incorporate a universal index combining an analogue pain measure with the patient's own rating of the effect of pain. Academic members of the board, both dentists and dental hygienists, recommended that school curricula should provide greater focus on the diagnosis and management of pain in general, with increased emphasis on dentin hypersensitivity. *Above all, dental care professionals are encouraged to screen routinely for dentin hypersensitivity and take the initiative in the dialogue on pain.*

Personal commitment is key in meeting today's growing expectations

In healthcare today, new attitudes and expectations, fostered by research, motivate healthcare professionals to treat pain decisively, even pre-emptively.²

Fortunately, treatment for the majority of dentin hypersensitivity cases can be simple. After confirming the diagnosis and educating the patient about the removal of risk factors, proper use of desensitizing toothpaste is recommended as first-line treatment. This convenient, inexpensive, non-invasive and reversible treatment choice can be initiated easily by patients at home and, with ongoing use, can prevent pain from returning. Considering comfort, convenience and cost, invasive and

irreversible procedures such as mucogingival surgery, pulpectomy or the use of resins, should be reserved for severe cases.

Development of more comprehensive dental educational programs, addressing the diagnosis and management of both acute and chronic pain, could further help alleviate or possibly eliminate most patients' painful symptoms.

The *Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity*, published in the April 2003 issue of the *JCDA*, is a welcome beginning. As a result of this effort, dental care professionals now have a practice guideline for dealing with dentin hypersensitivity. This report promotes professional awareness of the condition and greater responsibility for initiating communication with patients who may have dentin hypersensitivity. In meeting this challenge, dental practitioners will effectively manage one of the most common and misunderstood pain conditions in dentistry.

The Canadian Advisory Board on Dentin Hypersensitivity was supported by an unrestricted educational grant from GlaxoSmithKline Consumer Healthcare.



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Your Mouth

— Portal to Your Body



by Judy A. Lux, BA, MSW, and
Salme E. Lavigne, RDH, BA, MS(DH)

Canadian Dental Hygienists Association Position Paper on the Links between Oral Health and General Health: Part II

Parts I and II of this paper discuss four aspects of systemic health and their association with periodontal disease. Two conditions, respiratory disease and preterm low birth weight, are examined in this issue of the journal. Diabetes mellitus and heart disease were discussed in the May/June 2004 issue of Probe.

The Executive Summary, Introduction, and Methodology are repeated here to provide a link with Part I of the paper. Table numbers continue from Part I; endnote reference numbers repeat or continue the numbering in Part I.

EXECUTIVE SUMMARY

A large body of research indicates a striking association between oral health and systemic health. Heart disease, preterm low birth weight babies, diabetes mellitus, and respiratory disease are being linked to periodontitis.

- Periodontal disease may exacerbate diabetes mellitus. Mechanical periodontal therapy combined with systemic antibiotics may provide better metabolic control of type 2 diabetes, with a 0.8% to 11% reduction in glycated hemoglobin.
- Persons with periodontal disease have a 1.04 to 2.8 fold greater risk of incurring cardiovascular disease than persons without periodontal disease. Of the different types of cardiovascular disease, stroke shows the most robust association.
- Women with periodontal disease may have 4 to 7.9 times the risk of having a preterm birth than do women with good oral health—this is considered a moderate to high risk. Early identification and treatment of periodontal disease during pregnancy may reduce the risk of premature birth and low birth weight.
- A moderate association may exist between oral health and respiratory disease, with an average odds ratio (OR) of 3.04 for those at risk of developing respiratory disease.

A number of possible biological pathways link oral disease to systemic disease:

- oral biofilm that harbours biological pathogens
- transient or chronic bacteremia
- immunologic injury caused by endotoxins
- direct injury by lipopolysaccharides

Since periodontal disease is a potentially modifiable risk factor, being both preventable and treatable in most cases, dental hygienists may have an opportunity to contribute to decreasing the incidence and severity of these systemic diseases. This research opens the door for dental hygienists to work more collaboratively in interdisciplinary relationships with other health professionals. These findings can create opportunities for an integrated model of oral and general health and will strengthen the argument for an oral health system that is accessible to all citizens.

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*Approximately 10% to 15% of the world's population
is affected by advanced periodontal disease*

INTRODUCTION

ALARGE BODY OF RESEARCH INDICATES A STRIKING association between the multifactorial etiology of oral and systemic diseases. Heart disease, preterm low birth weight babies, diabetes mellitus, and respiratory disease are being linked to periodontitis.

The purposes of this position paper are to (1) gather comprehensive research information to offer a critical look at the relationships between oral health and systemic health outcomes; and (2) to present recommendations supporting clinical practice, policy making, and self-care decisions. This paper was posted on CDHA's website for comments. Members' feedback was incorporated into the document to help establish a consensus among the association's members on the recommendations. Experts in the oral health field were also consulted. This paper will be reviewed at regular intervals to ensure that it includes the current research.

Although increased attention has lately been paid to the mouth-body connection, this area of research has actually existed for 100 years. In 1909, Dr. William Hunter devised the "focal infection" or "focal sepsis" theory, stating that den-

tal (septic) infection was the most important cause and complication of medical diseases.² More recently, the term "periodontal medicine" has been used to describe a new oral health field that examines how periodontal infections interact intimately with the morbidity and mortality of individuals with certain systemic conditions.

For example, diabetes mellitus is currently considered a risk factor for periodontal disease. This is supported by large epidemiologic studies using multifactorial statistical analysis to ensure the results are not skewed by confounding co-risk factors.³

This paper examines the other side of the coin—the ways in which oral disease affects systemic health, specifically, chronic heart disease, respiratory disease, diabetes mellitus, and preterm low birth weight babies. Diabetes mellitus and heart disease were examined in Part I, published in the May/June 2004 issue of *Probe*. Part II looks at preterm low birth weight infants and respiratory disease. Due to space considerations, the suspected associations between oral health and *Helicobacter pylori* infection, nutrition, rheumatoid arthritis, stress, osteopenia, and Kindler syndrome will be considered in a later position paper.

The oral-systemic disease link is important because of the high occurrence of oral disease—approximately 10% to 15% of the world's population is affected by advanced periodontal disease⁴ and more than 50% of adults 55 or older have periodontitis.⁵ If periodontal disease is associated with systemic disease, then its prevention may have a significant positive impact on the general health of Canadians and thus limit the human and financial costs of systemic health issues. The following literature reviews will look at the research that explores oral and general health associations as well as the intervention studies that show how dental hygiene treatment affects systemic health. Appendix A contains the definitions of terms as they are used in this paper.

METHODOLOGY

The methodological approach in this paper is a review of the literature. The primary focus centres on periodontal health status measures and their associations with systemic diseases. The researchers conducted a detailed search of relevant international English language epidemiological evidence from 1996 to 2003 using MEDLINE, EMBASE, and the Cochrane controlled trials register. The search also included "gray" literature—information not reported in the

sion; diabetes mellitus; and multiple pregnancies.⁶² Many of these are also risk factors for periodontal disease.⁶² There is also evidence that several different types of microbial infections are also risk factors. Acute infections involving distant organ systems, such as the genitourinary tract, are implicated in adverse pregnancy outcomes, including preterm birth, rubella, shigellosis, encephalitis, and pneumonia.⁶⁴ Emerging evidence points to the role of periodontal infection in PLBW. Given that 25% to 100%⁶⁵ of pregnant women experience gingivitis—a preventable and treatable condition—research to determine if oral diseases are independent risk factors for PLBW is warranted.

Biological pathways

The biological mechanism to support a link between maternal periodontal disease and PLBW infants involves micro-organisms in the oral cavity that may enter the bloodstream passively through the inflamed periodontal pocket wall or through invasive oral procedures. The maternal periodontal infection then influences the fetoplacental unit in the following three ways:^{62,66,67}

Emerging evidence points to the role of periodontal infection in preterm low birth weight

scientific periodical literature—and web sites known to contain publications on this topic. In addition, references cited in the articles were manually searched, as opposed to computer data base search. Lastly, we asked recognized experts in the topic area for other possibly relevant articles that may have otherwise not been identified.

In vivo and human studies identified in the literature search were included in this review; in vitro and animal studies were excluded. The research was classified according to the Canadian Task Force on the Periodic Health Examination Evidence Classification Scheme (see Appendix B).

PRETERM LOW BIRTH WEIGHT BABIES

PRETERM BIRTH AND LOW BIRTH WEIGHT (PLBW) in infants create a significant public health problem, causing perinatal morbidity, including neurological abnormalities, mild learning disabilities, breathing problems (such as asthma), and developmental problems.⁶¹ Two estimates of costs are associated with PLBW infants: first, the costs associated with the care of preterm infants and neonatal intensive care add over US\$5 billion to US\$10 billion annually to the costs of childbirth.^{62,63} Second, costs for care per child over the lifetime are estimated at US\$500,000.⁶³

Established risk factors for PLBW include an older maternal age (>34 years) as well as younger (<17 years); African-American ancestry; low socio-economic status; inadequate prenatal care; drug, alcohol, and tobacco abuse; hyperten-

1. Action of the proinflammatory mediators

Periodontal diseases are associated with chronic gram negative anaerobic infections or those resulting in local and systemic elevations of proinflammatory prostaglandins, including prostaglandin E₂ (PGE₂) and cytokines (IL-1, IL-6, and TNF- α). It is the artificially high levels of the prostaglandins that foster premature labour.

2. The action of the periodontal reservoir of LPS

The oral micro-organisms themselves are not directly implicated in the PLBW; rather, the periodontal infection provides a source of microbial products such as lipopolysaccharides (LPS), which trigger the release of immune modulators such as prostaglandin E₂ (PGE₂) and cytokines—TNF α , IL-6, interleukin-1 β (IL-1 β). These immune modulators in turn target the placenta to influence the course of pregnancy.

3. Direct micro-organism assault on the fetoplacental unit

This mechanism involves translocation of periodontal pathogens to the fetoplacental unit, through the blood.

Research evidence

Four separate lines of evidence currently relate oral infection to pregnancy outcome: microbiological studies, case-control studies, prospective longitudinal studies, and intervention studies. Some of these are randomized controlled trials, testing the hypothesis that periodontal treatment of at-risk mothers will decrease the incidence of preterm low birth weight infants.

Long-term pain management tool?



NEW Canadian Consensus Report on dentin hypersensitivity recommends

a long-term approach to management, with desensitizing toothpaste as first-line treatment.†

The Report recognizes that the pain of sensitive teeth can be recurrent and that ongoing management and treatment are key to staying pain-free. An ongoing regimen of twice-daily brushing with desensitizing toothpaste like Sensodyne® is recommended as an efficacious, inexpensive and non-invasive first-line treatment for pain prevention.

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† Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity. Canadian Advisory Board on Dentin Hypersensitivity. *J Can Dent Assoc* 2003;69(4):221-226.

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The first line of evidence is found in several microbiological studies of amniotic fluid, maternal and fetal cord serum, and gingival crevicular fluid (GCF). The first two studies look at GCF and amniotic fluid and the role of PGE₂ and IL-1 β . Damare et al. (1997)⁶⁸ conducted a small study showing a high correlation in the levels of PGE₂ and IL-1 β in maternal GCF and amniotic fluid. Offenbacher et al. (1998)⁶¹ conducted a similar study and found that the GCF of 48 mothers of PLBW infants had higher levels of PGE₂ than mothers of infants with normal birth weight.

Study	Serum analysis	PLBW/PT	Normal birth
Offenbacher et al. (1999) ⁶⁹	IgM	33.3% of PLBW tested positive	17.9% tested positive
Madianos et al. (2001) ⁷⁰	IgM	19% of PT tested positive	6.9% tested positive

Table 3. Microbiological studies of fetal serum

disease is a statistically significant risk factor for low birth weight in infants. Using a multivariate logistic regression model, there was an odds ratio (OR) of 7.9 (95% CI, 6.27–9.58) for preterm low birth weight cases (PLBW) ($n = 93$). In other words, mothers with periodontal infection had more than seven times the risk of delivering a PLBW infant. One shortcoming of this study is that periodontal status was determined for all but 10% of the subjects, three days following the birth of their child. However, case-control studies usually assume that the exposure occurred prior to the outcome. In this study, it was not possible to determine whether these mothers had active periodontal disease prior to the birth or during pregnancy. Therefore, it is not possible to show causality.

A case-control study by Dasanayake (1998)⁷² involving 55 pairs of women in Thailand does not clearly support the link between periodontal disease and PLBW. Oral health status was measured using the Community Periodontal Index of Treatment Needs (CPITN) and Decayed, Missing, and Filled Teeth scores (DMTF). On the one hand, it shows that having good oral health reduces the probability of a low birth

The results provide strong support for the hypothesis that maternal periodontal disease is a risk factor for preterm birth, low birth weight, and fetal growth restriction, independent of other major risk factors

Two other studies examined maternal and fetal serum (see Table 3) and similarities in the antibody responses. Offenbacher et al. (1999)⁶⁹ analyzed blood samples from fetal cords for the presence of immunoglobulin M (IgM) antibody against various periodontal pathogens. Of the PLBW serum samples, 33.3% tested positive for IgM against the test micro-organism. However, only 17.9% of the normal birth weight samples tested positive. Recently, Madianos et al. (2001)⁷⁰ analyzed maternal plaque and serum, as well as fetal cord serum from 400 births. In the fetal serum, IgM seropositivity to maternal periodontal pathogens was 2.9 fold higher in preterm versus normal births (19% vs. 6.9%, respectively; $P = 0.0015$ chi square). These studies suggest that the oral pathogens may be translocating to the fetoplacental unit.

Each study suggests that periodontal infection is a source of microbial products that affect the pregnancy outcome. The studies also suggest that maternal periodontal infections, resulting in blood-borne micro-organisms that can translocate to the fetus, provide a systemic challenge to the fetus and induce an immunologic response. They show it is the inflammatory and host responses, not the clinical signs of periodontitis, that are associated with preterm births.

The second line of evidence comes from examining two case-control studies, where the case is defined as a low birth weight infant and a control is defined as a normal birth weight infant. Offenbacher et al. (1996)⁷¹ studied 124 pregnant or postpartum mothers and found that periodontal

weight infant (OR 0.3). Good periodontal health (measured by healthy sextants) presented an odds ratio of 0.3 (95% CI, 0.12–0.72), that is, mothers with more healthy areas of gingiva had a lower risk of giving birth to a low birth weight infant. However, it did not show that having *poor* periodontal health increases the chances of having a low birth weight infant. Poor periodontal health presented an odds ratio of 1.1 (95% CI, 0.12–0.72) for low birth weight. Data was analyzed using a conditional logistic regression analysis to control for other known risk factors. The study also did not find a significant association between some of the known risk factors, such as smoking, alcohol, and coffee consumption, and low birth weight. However, there may have been confounding factors at play in this study or the results could indicate that the link between periodontal disease and low birth weight does not exist in some populations.

The third line of evidence comes from two prospective studies. Preliminary results from a relatively large prospective study by Jeffcoat et al. (2001)⁷³ with approximately 1,300 mothers concluded that maternal periodontitis is an independent risk factor for preterm birth. Periodontitis in the mother was assessed at 21 to 24 weeks gestation. The researchers used multivariable logistic regression to calculate the adjusted odds ratio. For severe periodontitis, it was reported at 4.45 (95% CI, 2.16–9.18) for infants born before 37 weeks gestational age. The odds ratio increased to 7.07 (95% CI, 1.70–27.40) for delivery before 32 weeks gestational age. This prospective study and the case-control studies reported above are recorded in Table 4.

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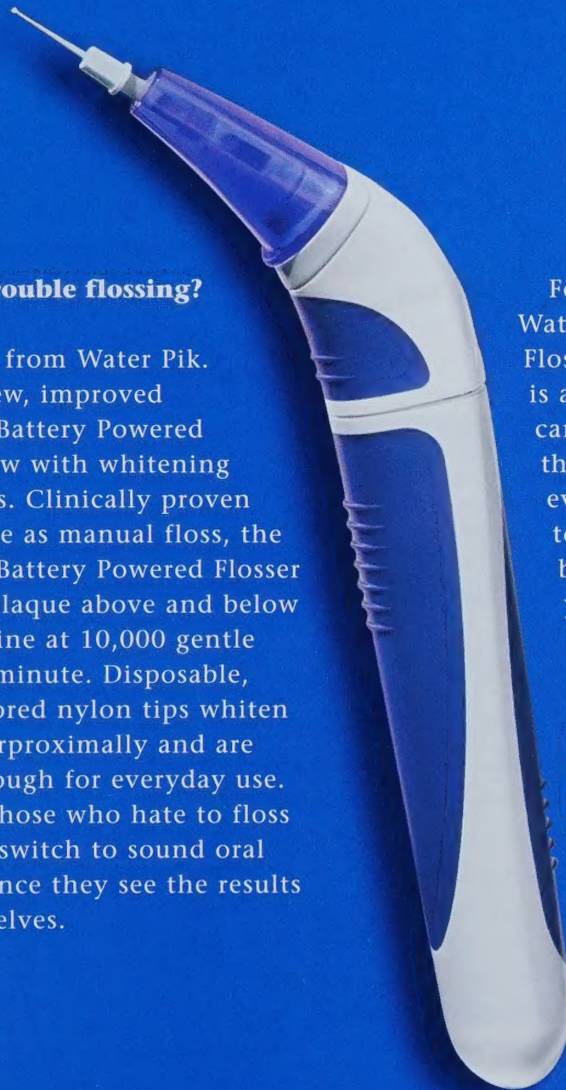


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Study	Outcome/ odds ratio	Oral exposure
Offenbacher et al. (1996) ⁷¹	PTB 7.9	Periodontal disease
Dasanayake (1998) ⁷²	LBW 1.1	Poor periodontal health
Dasanayake (1998) ⁷²	LBW .3	Good periodontal health
Jeffcoat et al. (2001) ⁷³	PTB 4 to 7	Severe or generalized periodontal disease

Table 4. Case-control studies and prospective studies showing the link between periodontal disease and PLBW

Preliminary findings are now available from the largest longitudinal prospective study reported to date on periodontal status in pregnant women. Offenbacher et al. (2001)⁶⁴ report on 814 deliveries with periodontal examinations performed

sites with an increase of 2+ mm periodontal disease, also contributes significant risk for fetal growth restriction. Although the number of neonatal deaths in the study was too small to be reliable, they indicated that neonatal mortality was linked with more severe maternal periodontal disease.

The fourth line of evidence comes from three intervention studies using periodontal treatment for pregnant mothers with existing oral health problems. (The two randomized controlled trials are listed in Table 5.) The first study conducted by Mitchell-Lewis et al. in 2001⁷⁴ showed a prevalence of 18.9% preterm low birth weight infants without periodontal treatment for the pregnant mothers versus 13.5% with treatment. Periodontal treatment included oral hygiene instruction and full-mouth debridement, including scaling, polishing with fluoridated paste, and dental sealants. Subjects included 164 women, 60% African-American and 39% Hispanic, between the ages of 12 to 19. There were several drawbacks to this study. One is that the effect of the intervention did not reach statistical significance. The second concern is that oral clinical exams were conducted only

Women with periodontal disease may have 4 to 7.9 times the risk of having a preterm birth than women with good oral health

at enrolment and again within 48 hours postpartum, with blinded examiners. The results provide strong support for the hypothesis that maternal periodontal disease is a risk factor for preterm birth, low birth weight, and fetal growth restriction, independent of other major risk factors. Also, incidence/progression of periodontal disease, defined as 4+

following delivery; therefore it was impossible to determine if periodontal disease or gingivitis existed prior to delivery. In addition, only four of the study subjects had periodontal disease. They did, however, display poor oral health habits, abundant plaque and calculus, and gingivitis. Although statistical significance was not reached, this was an early study that suggested the need for further exploration of this association.

Lopez et al. (2002)⁷⁵ conducted the first randomized controlled trial of its type with 351 women with periodontal disease. Results suggest that periodontal disease is an independent risk factor for preterm low birth weight. Periodontal therapy consisted of plaque control instructions, scaling, root planing, and chlorhexidine rinse once a day. In addition, 18% of the treatment group had severe periodontitis and were given metronidazole 250 mg plus amoxicillin 500 mg three times a day for seven days. The study took place in Chile with a population of low socio-economic status women of Spanish and local Aboriginal descent, predominantly Caucasian. For the first group, periodontal therapy was completed before 28 weeks of gestation and maintenance therapy was provided every 2 to 3 weeks until delivery. The second group received periodontal therapy postpartum. The incidence of PLBW in the first group, which was treated, was 1.84% (N 3/163)—significantly lower than in the control group, which was 10.11% (N19/188). Women with periodontal disease have more than four times greater risk of having a PLBW infant than periodontally healthy women. This figure was calculated from a multiple logistic regression model where mothers with peri-

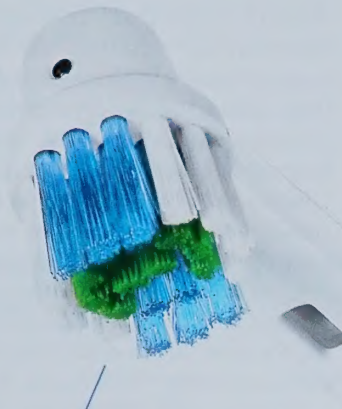
Study	Risk ratios (RR) Odds ratios (OR) and percentage 95% confidence interval (CI) for preterm birth	
	SRP + placebo	SRP + metronidazole
Jeffcoat et al. (2003) ⁷⁶		
PTB <37 weeks	0.5 RR (CI, 0.2–1.3)	1.4 RR (CI, 0.7–2.9)
PTB <35 weeks	0.2 RR (CI, 0.02–1.4)	0.7 RR (CI, 0.2–2.4)
Lopez et al. (2002) ⁷⁵		
	Treatment group 1.84% (3/163)	
	Control group 10.11% (19/188), OR 4.70; 95% CI, 1.29–17.13	

PTB Preterm birth SRP Scaling and root planing

Table 5. Intervention randomized controlled trials, Level 1 studies

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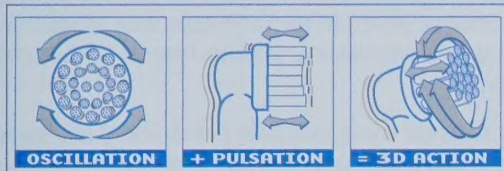


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¹ Heanue et al. Manual versus powered toothbrushing for oral health (Cochrane Review). In: The Cochrane Library, Issue 1, 2003, Oxford: Update Software.
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odontal disease had an odds ratio of 4.70; 95% confidence interval, 1.29 to 17.13.

Jeffcoat et al. (2003)⁷⁶ also conducted a randomized controlled trial with 366 women (85% African-American) with periodontitis between 21 and 25 weeks gestation to determine whether treatment of periodontitis reduces the risk of spontaneous preterm birth (SPTB). Subjects were randomly assigned to one of three treatment groups: (1) dental prophylaxis (tooth cleaning and polish) plus placebo capsule three times a day; (2) scaling and root planing plus placebo capsule three times a day; and (3) scaling and root planing plus metronidazole 250 mg three times a day for one week. Results show that the rate of preterm birth at <35 weeks was 4.9% for the first group (prophylaxis plus placebo), 3.3% for the third group (scaling and root planing plus metronidazole), and the lowest rate of 0.8% for the second group (scaling and root planing plus placebo). The rate of preterm birth was 6.3% in the reference or untreated group. Results also show as much as an 84% reduction in spontaneous preterm birth at <35 weeks gestation in subjects receiving scaling and root planing compared with the prophylaxis plus placebo group.

large or to women without periodontal disease, for two reasons. First, the reference groups for the studies consisted only of individuals with oral health problems. Second, in one of the randomized controlled trials, there was a predominantly African-American population. Therefore, additional research is needed to determine if there is a definitive causal link between periodontal disease and PLBW babies.

Research studies are more easily compared when criteria for definitions are consistent. Fortunately, the studies all appear to agree that low birth weight is defined as a birth weight less than 2,500 g and that preterm delivery is defined as prior to 37 weeks of gestational age. However, the studies show a large variation in oral health measurements. For example, Offenbacher et al. (1996)⁷¹ and Jeffcoat et al. (2003)⁷⁶ use a similar periodontal status measurement, defined as mean clinical attachment levels (CAL mm/site) and Offenbacher also included probing depths and bleeding on probing. Dasanayake (1998)⁷² measured periodontal status by using the Decayed, Missing and Filled Teeth index (DMFT) and the Community Periodontal Index of Treatment Needs (CPITN). Finally, Offenbacher et al. (2001a)⁶⁴ used a three-level definition of periodontal disease—periodontally

Researchers postulate that poor oral hygiene... lead[s] to colonization of dental plaque by the respiratory disease micro-organisms

Discussion

Collectively, the results from the case-control, prospective, and intervention studies show a possible link or correlation between periodontal disease and PLBW and preterm birth, and suggest that periodontal treatment may reduce the risk of PLBW. The studies suggest that exacerbation of existing periodontal disease, as well as pregnancy-induced gingivitis, may be harmful to the fetus. Women with periodontal disease may have 4 to 7.9 times the risk of having a preterm birth than women with good oral health. Using a risk factor of 7, Offenbacher and Beck calculate that as much as 18% of the total incidence of PLBW could be eliminated if periodontal disease is eliminated. This would result in the prevention of 45,000 preterm births in the United States each year, with a savings of \$1 billion in intensive care costs alone.⁷⁷

Although case-control and prospective studies provide important information, randomized controlled trials are the only studies that can show a cause-and-effect association between periodontal infection and PLBW and provide convincing evidence that treatment of periodontal disease will reduce the risk of PLBW. This report includes two such studies that suggest early identification and treatment of periodontal disease during pregnancy can reduce the risk of premature birth and low birth weight. Unfortunately, both these studies contain weaknesses. The results from these two trials are limited in their generalizability to the population at

healthy mothers, a mild disease group, and a moderate-severe group. The moderate-severe group was defined as ≥ 4 sites with at least 5 mm periodontal disease and 2 mm attachment loss at ≥ 4 sites. The use of different types of measurement makes the translation of research findings into clinical guidelines more complex.

Many of the risk factors that are generally accepted as related to preterm delivery are interrelated, such as smoking, alcohol consumption, socio-economic status, and age of mother. Therefore, unless the research studies control for these factors using a multivariate logistical model, the associations are questionable. Unfortunately, only four studies in this report used a multivariate logistical model in the statistical analysis.

There are some commonly held beliefs about recommendations for oral health care of pregnant women. The American Dental Association, for example, suggests that elective oral health care should be avoided, if possible, during the first trimester and the last one-half of the third trimester.⁷⁸ This recommendation takes into account the periods of greater vulnerability and risk of harm to the developing embryo or fetus. In light of the results of recent research, there may be a need to re-evaluate this recommendation, taking into account the potential risk of harm to the developing embryo if periodontal treatment is not provided.

Recommendations

Clinical

In light of the possible link between periodontal infection and adverse pregnancy outcomes, and the intervention studies showing that treatment of periodontal disease may reduce the risk of PLBW infants, the following are some suggestions for dental hygienists. All clinical decisions, however, should be based on the needs of the specific client:

- Consider educating pregnant clients and those contemplating pregnancy about the correlation between periodontal disease and PLBW babies and the implications.
- Consider periodontal therapy as a necessary part of prenatal care for all clients.

RESPIRATORY DISEASE

RESPIRATORY DISEASES (RD) INCLUDE CHRONIC obstructive pulmonary diseases (COPD) such as bronchitis and emphysema, and acute respiratory diseases including influenza, pneumonia, and acute bronchitis. Over 3 million Canadians have serious respiratory diseases that account for \$12.8 billion of expenditures per year, including the direct visible costs of hospitalization, drugs, and physician visits as well as the indirect costs associated with disability and mortality.⁷⁸ Hospital inpatients develop pneumonia more than 5% of the time, and pneumonia accounts for the majority of admissions to hospitals from nursing homes. This increases hospital inpatient time and

163

Reference	Study design	Subjects	Exposure	Outcome	Odds ratio/ risk ratio	95% CI
Terpenning et al. (2001) ⁸⁷	Prospective enrolment, retrospective analysis of data	358 community dwelling and institutionalized veterans	Decayed teeth	Aspiration pneumonia	OR 1.2	1.1–1.4
			Organisms for decay		OR 6.2	1.4–27.5
			Periodontal disease		OR 4.2	1.6–11.3
Mojon et al. (1997) ⁸⁸	Longitudinal	302 institutionalized seniors	Periodontal disease, caries, and mucosal disorders and the presence of oral disorder that could develop into a dental emergency	Respiratory tract infection	RR 1.9	1.1–3.9
Scannapieco et al. (1998) ⁸⁹	Cross-sectional	234 community dwelling subjects	Oral hygiene index (OHI)	Respiratory disease (n=41)	OR 4.5	1.06–18.99
Hayes et al. (1998) ⁹⁰	Cross-sectional, longitudinal	1,118 community dwelling veterans	Alveolar bone loss	COPD (n= 297)	RR 1.8	
Scannapieco and Ho (2001) ⁹¹	Cross-sectional	13,792 community dwelling subjects	Attachment loss	COPD	OR 1.45	1.02–2.05

OR Odds ratio RR Risk ratio COPD Chronic obstructive pulmonary disease CI Confidence interval

Table 6. Associations between oral health and respiratory disease, Level II studies

- Preventive oral health education should be a part of prenatal public health education.
- Oral health outreach should be provided to those individuals who do not seek preventive care during pregnancy.

Research

Suggestions for further research:

- Studies on the link between periodontal disease and PLBW infants should be conducted, particularly randomized controlled trials, with larger numbers of participants, and a wider spectrum of participants, including more ethnically and economically diverse general populations.
- Studies to prove oral health education and community support prevent PTLBW.
- Universal criteria should be used in studies for defining periodontal disease.

costs and causes significant morbidity and mortality.⁸⁰ Ventilator-associated pneumonia, from hospital-acquired (nosocomial) bacterial pneumonia, is a leading cause of death from hospital-acquired infections with a crude mortality rate of approximately 30%.⁸¹

Biological pathways

Several biological mechanisms are hypothesized to explain the link between microbial infections and pneumonia.^{66,80,82}

1. Oral micro-organisms are aspirated into the respiratory tract and host defence mechanisms fail to eliminate the micro-organisms causing aspiration pneumonia.
2. Dental plaque acts like a reservoir for respiratory pathogen colonization. Periodontal disease-associated enzymes in saliva may modify mucosal surfaces to promote adhesion and colonization by respiratory pathogens. Periodontal disease-associated enzymes may

Reference	Subjects	Intervention	Outcome	Odds ratio	95% CI
DeRiso et al. (1996) ⁹²	353 ICU subjects	0.12% chlorhexidine gluconate 2X/day	Nosocomial infection	0.32	0.14–0.72
Pugin et al. (1991) ⁹³	52 subjects on mechanical ventilation	PNV (polymyxin B sulfate, neomycin sulfate, and vancomycin hydrochloride)	Pneumonia	5 times less frequently	
Yoneyama et al. (1999) ⁹⁴	366 nursing home residents	1% povidone iodine and oral hygiene care	Pneumonia	0.60	0.36–0.99
Fourrier et al. (2000) ⁹⁵	30 treatment, 30 control ICU subjects	0.2% chlorhexidine gel 3X/day	Nosocomial infection	0.27	0.09–0.80

Table 7. Effect of oral care interventions on risk of respiratory disease (RCT studies), Level 1 Studies

destroy salivary pellicles on pathogenic micro-organisms, causing them to adhere to mucosal surfaces. These pathogens are then shed into the salivary secretions and aspirated into the lung to cause infection.

3. Respiratory pathogens adhering to plaque in clients with periodontitis may be abundant following treatment with antibiotics. These micro-organisms are aspirated into the lung, causing pneumonia.
4. Cytokines originating from periodontal tissues may contribute to respiratory inflammation by altering respiratory epithelium.

El-Solh et al. (2003)⁸⁵ confirms Russell et al.'s results in a study that included 95 institutionalized seniors and analysis with a logistic regression model. The El-Solh study suggests that aerobic micro-organisms that colonize dental plaque may play a significant role in aspiration pneumonia. This study also suggests a potential link between functional status—measured by activities of daily living—and anaerobic pulmonary aspiration in the elderly. The researchers postulate that poor oral hygiene related to a decrease in activities of daily living combined with difficulty accessing profes-

The balance of epidemiological research shows a moderate association between oral health/periodontal disease and respiratory disease

Research evidence

This section first examines some cross-sectional, longitudinal, and retrospective studies. Random controlled trials are then discussed. The final portion looks at research from the nursing field reporting on physician and nurse involvement with oral health and the link between poor oral health and ventilator-associated pneumonia.

The following summarizes evidence from eight epidemiological studies indicating an association between oral infections and respiratory infections. (See Table 6 for an evidence table of the research showing odds ratios.) Three studies show a high degree of respiratory pathogen colonization of plaque in institutionalized populations and the researchers suggest that the mechanism for this colonization is poor oral hygiene. Other reviewers agree that the mechanism is poor oral hygiene.^{80,83} Russell et al. (1999)⁸⁴ conducted a cross-sectional study comparing 28 institutionalized seniors with 30 community-dwelling senior outpatient controls. They found that 14% versus 0% respectively showed positive for respiratory pathogen colonization of plaque. Oral colonization of plaque was also associated with COPD and with higher plaque scores. They suggest that deficient plaque control is related to respiratory pathogen colonization of plaque.

sional dental care lead to colonization of dental plaque by the respiratory disease micro-organisms.

Fourrier et al. (1998)⁸⁶ conducted a prospective study of 57 patients in an intensive care setting. Over time, there were increases in both dental plaque and respiratory pathogens in the dental plaque, which were associated with pneumonia. The researchers suggest that poor oral health may predispose institutionalized patients to oral colonization by respiratory pathogens.

Several studies show a connection between poor oral hygiene and respiratory disease in an institutionalized population and a community dwelling population. The first study examines both of these populations. Terpenning et al. (2001)⁸⁷ conducted a study with prospective enrolment of subjects with retrospective analysis of the data. Of the 358 enrolled veteran subjects, 50 developed aspiration pneumonia and 28 of those were dentate. A logistic regression model, which controlled for established medical risk factors in aspiration pneumonia, indicated that the dentate subjects with oral health problems had a higher risk of developing aspiration pneumonia, decayed teeth (OR 1.2), presence of organisms for decay in saliva (OR 6.2), and periodontal disease (OR 4.2). Oral health problems were measured by oral hygiene, dental caries, periodontal disease, number of teeth, chewing potential, and presence of removable prostheses.

The next study examines an institutionalized population. Mojon et al. (1997)⁸⁸ demonstrated that poor oral hygiene might be a major risk factor for respiratory tract infection in an elderly institutionalized population. They studied 302 seniors in a medical care facility and found that individuals with poor oral hygiene and the presence of a potential dental emergency had a greater risk for respiratory tract infections (RR 1.9; 95% CI, 1.1–3.9). The oral exam included an evaluation of hygiene, periodontal disease, caries, and mucosal disorders.

The next three studies examine community dwelling populations. Scannapieco et al. (1998)⁸⁹ analyzed the National Health and Nutrition Examination Survey I (NHANES I) and suggest an association between poor oral hygiene and chronic respiratory disease. In this cross-sectional epidemiological study, oral hygiene was measured with the oral hygiene index (OHI), including oral debris and/or calculus. Of the 234 subjects, 41 developed chronic respiratory disease. Multivariate analyses controlled for relevant covariates. Logistic regression analysis of data was used to determine that subjects with the maximum OHI value (poor oral health) were 4.5 times more likely (OR 4.5; 95% CI, 1.06–18.99) to have a chronic respiratory disease than those with an OHI of zero. No link was found between periodontal disease and respiratory disease and between poor oral health and acute respiratory diseases.

In contrast to Scannapieco et al. (1998), Hayes et al. (1998)⁹⁰ conducted a prospective, cross-sectional, longitudinal, epidemiological study using data from the Veterans Affairs Dental Longitudinal Study (DLS) and Normative Aging Study (NAS). They found that periodontal disease measured with alveolar bone loss at baseline was associated with risk for subsequent development of COPD. The bone loss was measured with periapical radiographs. Of the 1,118 subjects who initially enrolled in the study, only about one-quarter developed COPD over the subsequent 25 years. Subjects in the worst population quintile had alveolar bone loss of >20% per site. The risk of COPD was 1.8 times greater for those subjects with the worst alveolar bone loss versus those with <20% alveolar bone loss per site. A logistic regression model accounted for known risk factors associated with COPD. One drawback to this study is that baseline pulmonary function was not adjusted for in the logistic regression analysis and may be confounding the association.

Scannapieco and Ho (2001)⁹¹ report on a retrospective study of cross-sectional data from the National Health and Nutrition Examination Survey III (NHANES III) database. They show an association between periodontal disease and COPD. Variables such as smoking, diabetes mellitus, alcohol use, education, income, sex, age, and socio-economic status were controlled for using a logistic regression analysis. Oral health status was assessed using the decayed, missing, or filled, surfaces/teeth (DMFS/T) index, and periodontal health was measured using attachment level, gingival bleeding, and the dental health index. Subjects with mean attachment loss (MAL) ≥ 3.0 mm had a higher risk of COPD (OR 1.45; 95% CI, 1.02–2.05). There was also a possible dose-response relationship, whereby lung function diminished with increasing periodontal attachment loss.

The following summarizes four randomized controlled trials showing that oral hygiene treatment reduces the risk of pneumonia for high-risk subjects and one study showing that oral hygiene treatment lowers colonization of respiratory pathogens. Table 7 is an evidence table of the randomized controlled studies dealing with this topic.

DeRiso et al. (1996)⁹² conducted a randomized controlled trial with 353 subjects in an intensive care unit. Subjects receiving an oral rinse of 0.12% chlorhexidine gluconate twice per day had a 65% reduction in the incidence of nosocomial infection (OR 0.32; 95% CI, 0.14–0.72) and 69% reduction in respiratory tract infection, compared with the control group who received no oral rinse.

Pugin et al. (1991)⁹³ conducted a double-blind randomized controlled trial with 52 patients requiring mechanical ventilation. Subjects received either an oral antibiotic rinse, which was also swallowed, or a placebo. The rinse consisted of polymyxin B sulfate, neomycin sulfate, and vancomycin hydrochloride (PNV). Colonization by gram negative micro-organisms and staphylococcus aureus, as well as pneumonia, occurred five times less frequently in the PNV group than in the placebo group (16% and 78% respectively, $p > .0001$).

Yoneyama et al. (1999)⁹⁴ conducted a randomized controlled trial and reported that the risk of pneumonia was 1.67 times higher (95% CI, 1.01–2.75) in the control group

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than in the group that received oral hygiene treatment, including application of 1% povidone iodine to the pharynx and oral hygiene care. The test group consisted of 184 subjects and the control group 182. Treatment group results are as follows: odds ratio 0.60, 95% confidence interval 0.36–0.99.

Fourrier et al. (2000)⁹⁵ conducted a randomized controlled trial with 30 treatment and 30 control intensive care unit subjects on mechanical ventilation. The treatment group received dental plaque antiseptic decontamination with 0.2% chlorhexidine gel, applied three times per day. The group receiving oral decontamination had a significantly reduced rate of nosocomial infection (OR 0.27; 95% CI, 0.09–0.80).

Abe et al. (2001)⁹⁶ conducted a study composed of 54 seniors with daily nursing care, 21 healthy seniors, and 22 healthy young subjects as controls. They found that the seniors with daily nursing care who gargled with a saline solution had a lower colonization of respiratory pathogens than the elderly control subjects without oral care. However, this study has been challenged for its lack of baseline data and poor statistical analysis.⁹⁷

Additional contributing factors to the development of respiratory disease are noted in the nursing and critical care medicine literature. “Neither nursing home staff nor physicians appear to give high priority to the oral care of residents.”⁸⁵ In addition, nurses primarily use sponge toothettes for intubated ICU patients’ oral care, despite the toothettes’ ineffectiveness.⁹⁸ Even though tooth brushing is an independent nursing action, it is not routinely performed for critically ill patients. Micro-organisms from the mouth may then become aspirated into the lower respiratory tract. Infection sets in when the micro-organisms multiply and the host defence mechanisms fail to eliminate them. Prevention of respiratory disease would thus involve better oral health care for ICU patients. Several authors in the nursing field agree with this call for better oral care when they suggest that the teeth of ICU patients should be brushed regularly—some say every 2 to 4 hours—to prevent ventilator-associated pneumonia.^{99–101}

Discussion

The balance of epidemiological research shows a moderate association between oral health/periodontal disease and respiratory disease. The associations are consistently positive, with only one study challenging this by showing no association between periodontal disease and respiratory disease, possibly due to weaknesses in this study that will be discussed later in this section. It is difficult to quantitatively combine the results of the studies, since they have a high degree of variation in the outcome—which included COPD, pneumonia and respiratory disease—and in the exposure—which included attachment loss, alveolar bone loss, and caries. However, with all of the differences in the studies aside, the OR ranged from a low value of 1.2 to a moderate value of 6.2 with a moderate average of 3.04. Although the risk is moderate, due to the prevalence of respiratory disease, even a moderate risk can have major implications for population health. Another highlight of this research is that one of

the studies showed a possible dose-response relationship, whereby lung function diminished with increasing periodontal attachment loss.

There are several limitations in this research. Some of the risk factors for respiratory disease and for poor oral health include poor nutritional status, mediocre functional status, and smoking.⁹⁷ Although some of the studies controlled for smoking, many did not control for all of these factors, resulting in the possibility that confounding variables skewed the results. Secondly, two of the studies had small numbers of subjects. In Scannapieco et al. (1998),⁸⁹ the combination of a small subject size and the fact that respiratory disease is uncommon in community dwelling populations may preclude detection of statistical significance of a link between periodontal disease and respiratory disease. There are two other concerns with Scannapieco et al. (1998).⁸⁹ Chronic respiratory disease may be an inaccurate diagnosis, since it was not assessed using laboratory and/or radiographic tests, and the oral indices in the NHANES have been challenged as being insensitive.^{80,89}

Although the number of randomized controlled trials are low, they indicate that dental hygiene treatment may decrease the prevalence of oral respiratory pathogen colonization and reduce the risk of respiratory infection in high-risk subjects. The intervention research does support providing preventive oral health care to the elderly, especially those in institutional settings, who are at high risk of developing respiratory disease. Reduction in plaque may be particularly important due to its potential role as a reservoir for respiratory pathogens and the development of nosocomial pneumonia. Periodontal disease along with other factors, such as smoking, environmental pollutants, viral infections, allergies and/or genetic factors may play a role in the development of respiratory disease.

There are several limitations in the randomized controlled trials. First, the number is small, limiting the strength of the evidence. Second, there are a small number of subjects in two of the studies, Pugin et al. (1991)⁹³ and Fourrier et al. (2000).⁹⁵ Third, two of the studies—DeRiso et al. (1996)⁹² and Fourrier et al. (2000)⁹⁵—did not provide any oral health status data. Due to these limitations, it may not be possible to conclude definitively that poor oral health causes respiratory disease. Thus there is a need for further randomized controlled trials to verify the importance of oral hygiene treatment in respiratory disorders.

The factors involved in the pathogenesis of respiratory disease and periodontal disease are multidimensional with considerable overlap. Although the microbial mechanisms are uncertain, the randomized controlled trials and associational research indicate that respiratory pathogens adhere to plaque. Plaque buildup results from poor oral hygiene, which may originate with inattention to oral care by institutionalized seniors, ICU patients, physicians, and nurses. These factors, combined with difficulty in accessing professional oral health care, may contribute to colonization of plaque by respiratory disease pathogens. Increased attention to oral health in this high-risk population may result in a lower incidence of respiratory disease.

Recommendations

Clinical

Some general suggestions for dental hygienists follow; however, all clinical decisions should be based on the needs of the specific client:

- There is a need for dental hygienists to provide health promotion and disease prevention services for individuals at high risk for respiratory infection in intensive care units and long-term care facilities.
- There is a need for education in oral health care and the possible links with respiratory disease for intensive care unit and long-term care facility staff.

Research

- Randomized controlled trials with larger subject numbers.
- Research to delineate the best procedure for oral health care in intensive care units.

CONCLUSIONS

IS THE MOUTH REALLY THE PORTAL TO THE BODY? The biological theories suggest that plaque harbours biological pathogens, which lead to chronic or acute bacteremia and to systemic damage by endotoxins and lipopolysaccharides. These processes may lead to chronic and acute systemic infections. The epidemiological evidence, although preliminary, suggests that oral health and oral infections may have an association with the occurrence and severity of a wide variety of systemic conditions and diseases such as heart disease, preterm low birth weight babies, respiratory disease, and diabetes mellitus. The association is not indicated simply by clinical signs of periodontal disease, but by molecular criteria, such as immune and inflammatory mediators. Since periodontal disease is a potentially modifiable risk factor, being both preventable and treatable, an opportunity may exist for dental hygienists to play a key role in decreasing the incidence and severity of these systemic diseases.

The studies show a small-to-large association between periodontal disease and some systemic disorders, including diabetes mellitus, heart disease, preterm low birth weight babies and respiratory disease. Conclusions from the research are as follows:

- Periodontal disease may exacerbate diabetes mellitus and mechanical periodontal therapy combined with systemic antibiotics may provide better metabolic control of type 2 diabetes, with a .8% to 11% reduction in glycated hemoglobin.
- Persons with periodontal disease may have a 1.04 to 2.8 fold greater risk of incurring cardiovascular disease than persons without periodontal disease; of the different types of cardiovascular disease, stroke shows the most robust association.
- Women with periodontal disease may have 4 to 7.9 times the risk of having a preterm birth than women with good oral health. This may be considered a moderate to

high risk. Also, early identification and treatment of periodontal disease during pregnancy may reduce the risk of premature birth and low birth weight.

- A moderate association may exist between oral health and respiratory disease, with an average odds ratio of 3.04, for those at risk of developing respiratory disease.

Periodontal infections are quite common, with advanced disease affecting about 10% to 15% of the population worldwide.⁴ As the population ages, the prevalence of periodontal disease is bound to increase as more people are retaining their teeth. Although the association between oral health and general health varies from small to large depending on the specific health issue, due to the high prevalence of some health issues, even a small to moderate risk can have major implications for population health. Taking these demographic issues into consideration, preventing periodontal disease may have a greater role to play in general health in the near future.

Dental hygienists can play an active role in translating this research knowledge into information that the public can use to make decisions about their own health. This information may be the motivating factor for good oral health, since there is now evidence of its link to other conditions that are traditionally considered more serious. There is also an important on-going role for dental hygienists in assessing health risks and referring clients for periodontal assessments. The growing realization of the association between oral health and systemic health brings increased responsibilities for dental hygienists to be more aware of the potential impact of their treatment. The research in this paper also points to roles for dental hygienists in health promotion and disease prevention, roles that need to be further developed. There should be dental hygienists in every hospital, intensive care unit, health unit, and community health centre. These roles will make it increasingly important for dental hygienists to have knowledge of and experience in interdisciplinary practice.

To help clarify the role of oral health promotion in the incidence and management of systemic diseases, further research is required through randomized controlled trials and longitudinal interventional studies that attempt to reduce the risk for a particular systemic disease, following treatment or prevention of periodontal infections. Only through randomized controlled trials can we reach the conclusion that periodontal disease causes or exacerbates systemic disease. There is also a need for further studies showing consistency or differences in associations in different populations, such as low-income groups, multicultural groups, Aboriginal peoples, and women.

The associations identified in this paper can significantly affect the importance of the role of the dental hygiene profession, change how oral health is perceived, and change the discipline of periodontal medicine. This research also opens the door for dental hygienists to work more collaboratively in interdisciplinary relationships with other health professionals. This evidence will create opportunities for an integrated model of oral health and general health and strengthen the argument for an oral health system that is accessible to all citizens.

APPENDIX A

Definitions

This section defines terms as they are used in this report.

Bacteremia: the presence of micro-organisms in the bloodstream. Transient bacteremia can be caused by oral micro-organisms entering the bloodstream through chewing, toothbrushing, flossing, periodontal infections, and some dental procedures.

Case-control study: a retrospective study in which people with a condition are compared with people without it, but who are similar in other characteristics

Causality: a cause for systemic diseases can be determined only by means of a randomized controlled trial (RCT). This study design allows the potential causal factors to be controlled by the investigator, who assigns persons randomly to the experimental and control groups.

Confidence interval (CI): the range within which the true size of effect lies with a given degree of assurance. A 95% confidence interval is the interval that includes the true value in 95% of cases.

Cross-sectional study: a study in which the health conditions of a group of people who are, or are assumed to be, a sample of a particular population are assessed at one time.

Gingivitis: an infectious inflammatory process limited to the gingiva.

Infection: invasion and proliferation of micro-organisms or other pathogenic micro-organisms in body tissues and the reaction of the tissues to their presence.

Logistic regression: statistical analysis that allows the separation and measurement of the relative contributions of a number of factors from among many risk factors that are present at the same time. For example, logistic regression can be used to describe how periodontal infection independently contributes to preterm low birth weight in infants, when other risk factors such as smoking are also present. (Multiple/multivariate/multifactorial/multivariable logistic regression is the relationship between the dependent variable and more than one independent variable. Conditional logistic regression is used to investigate the relationship between an outcome and a set of prognostic factors in cohort and matched case-control studies.)

Longitudinal study: a study in which the same group of people is studied on two or more occasions.

Nosocomial pneumonia: hospital-acquired pneumonia

Odds ratio (OR): measurement of risk used in case-control studies where risks are examined retrospectively for those with and without disease. It is calculated by taking the number of people with a disease who were exposed to the risk factor over the number of people with the disease who were not exposed. It is a way of comparing whether the probability of a certain event is the same for two groups. An odds ratio of 1 implies that the event is equally likely in both

groups; an odds ratio greater than one implies that the event is more likely in the first group. An odds ratio less than one implies that the event is less likely in the first group. Case-control studies use OR.

Prospective study: a study where information on an exposure of interest is used to compare eventual outcomes.

Relative risk factor (RR): measurement of how much a particular risk factor influences the risk of a particular outcome. A relative risk of 2 means that a person has a two-fold increased risk of having a particular outcome. Cohort studies use RR.

P value: when statistical analysis of the study data differs between the control and experimental group or the before-and-after treatment group finds a P value greater than .05 (5%), the difference is considered non-significant. In order to have significant results, the p value must be less than 5% (.05). meaning the results were not just due to chance.

Periodontal disease: periodontal diseases are caused by chronic gram-negative micro-organisms that accumulate in plaque biofilms and result in the inflammatory destruction of the structures of the periodontium, including the periodontal ligament, cementum, alveolar and supporting bone. These diseases result from exposure of the periodontium to dental plaques, biofilms that accumulate on the teeth. The inflammation around the tooth may allow micro-organisms or their products, including lipopolysaccharides, peptidoglycan fragments, and hydrolytic enzymes, into the systemic circulation. The host response to periodontal infections results in the local production of cytokines and biological mediators including interleukins and prostaglandins as well as the introduction of serum antibodies.³³

Randomized controlled trial (RCT): the strongest experimental design in which subjects are randomly assigned to treatment groups, with one group being a control group. The RCT provides the most powerful research evidence and can show causality.

Retrospective study: a study that begins with an outcome and investigates back for exposure information.

Systemic disease: a disease that affects the whole body

Therapeutic seeding: within the context of a diabetic client, it refers to a clinician's discussion with a pre-symptomatic client regarding his or her susceptibility to diabetes and suggestions for life style changes that include exercise, weight loss or control, and knowledge of risk factors.

APPENDIX B

Canadian Task Force on the Periodic Health Examination Evidence Classification Scheme

Levels of evidence*

- I: Evidence obtained from at least one properly randomized controlled trial.
- II-1: Evidence obtained from well-designed controlled trials without randomization.
- II-2: Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one centre or research group.
- II-3: Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category.
- III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

* Criteria developed by the Canadian Task Force on the Periodic Health Examination. Goldbloom R, Battista RN. The Periodic Health Examination: 1. Introduction. *CMAJ* 1986; 134(7):721-3.

APPENDIX C

Three levels of oral disease prevention for the diabetic client

Hein* suggests the following three levels of prevention for clients with diabetes or at risk of developing diabetes:

- Primary prevention, which is aimed at pre-symptomatic yet susceptible individuals and includes health promotion and therapeutic seeding.
- Secondary prevention includes early diagnosis and screening for type 2 diabetes using glucometers at the chairside, for clients considered by history and clinical findings to be at risk for diabetes. This suggestion is of particular importance, given the suggestion by Lamster and Lalla** that some patients are seen in their dentist's office on a more regular basis than they are seen in a physician's office.
- Third level prevention (or tertiary prevention) is rehabilitation of the chronic diabetic client, including minimizing the loss of periodontal support.

* Hein C. Getting it right in long-term management of chronic periodontitis associated with diabetes, Part 1. *Contemporary Oral Hygiene*. 2003;3(9): 24-31.

** Lamster IB, Lalla E. Periodontal disease and diabetes mellitus: discussion, conclusions, and recommendations. *Ann Periodontol*. 2001;6: 146-49.

APPENDIX D

Oral procedures creating risk of bacteremia^{58,59}

The following is a list of oral procedures that create a risk for bacteremias: periodontal treatment and prophylactic cleaning of teeth or implants where bleeding is anticipated, periodontal surgery, scaling, root planing, probing, recall maintenance, initial placement of orthodontic bands but not brackets, intraligamentary local anesthetic injections, oral irrigators or air abrasive polishing devices, dental extractions, implant placement and tooth reimplantation, endodontic surgery or instrumentation beyond the root apex, and subgingival placement of antibiotic fibers or strips.

Cardiac conditions requiring prophylaxis for dental treatment^{59,60}

High risk

- Prosthetic cardiac valves, including bioprosthetic and homograft valves.
- Previous infective endocarditis, even in the absence of heart disease.
- Complex congenital cardiac malformations (e.g., single ventricle states, transposition of the great arteries, tetralogy of Fallot).
- Surgically constructed systemic/pulmonary shunts.

Moderate risk

- Rheumatic and other acquired valvular dysfunction even after valvular surgery.
- Hypertrophic cardiomyopathy.
- Mitral valve prolapse with valvular regurgitation and/or thickened leaflets
- Non-complex congenital cardiac malformations.

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The endnote numbering repeats or continues from the first part of this paper, published in the May/June 2004 issue of Probe.

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"INVOLVEMENT" (continued from page 151)

cent in 1993 to 22.4 per cent in 2000. Only one in five eligible new voters is participating in determining the course of action for our nation. Why this voter apathy? How to engage our youth so they realize they have a part to play in determining the future?

These questions percolated through my thoughts, leading me to the dental hygiene profession. We have a group of well-connected and committed dental hygienists in this country who are very involved with setting the course of action for the profession. Often they have to make personal sacrifices but they believe in what they are doing and are proud to be doing it. Many of these leaders are advancing dental hygiene education; many were involved in achieving self-regulation for the profession in their jurisdictions. Many dental hygienists in the country who are still working to

achieve this privilege understand the importance of self-regulation to the future of the profession and are persevering in their efforts. We must honour what they have done and are doing.

Dental hygienists working in a jurisdiction where self-regulation has existed for many years may take it for granted, as we as Canadians may take our many privileges for granted. But there is still much work to be done for the profession whether a dental hygienist is in a self-regulated jurisdiction or not. As a young dental hygienist, are *you* involved in your profession? What are the factors that might lead to professional apathy? What is important to you as a professional dental hygienist? How can we engage you in moving the profession into the future? I invite you to share your thoughts with me at <saz@cdha.ca> or 1-800-267-5235.

"L'ENGAGEMENT" (suite de la page 151)

troisième simplement parce que c'est le seul autre choix possible. » Voilà un triste commentaire à propos d'un pays qui est le fruit de tant de labeur de la part de ses citoyens. Si l'on se fie aux nouvelles du jour, ce que nous avons de mieux comme porte-étendard de la fierté canadienne, ce sont peut-être bien les Flames de Calgary... qui ne sont plus seulement l'équipe de Calgary, mais bien celle du Canada tout entier.

Il y a soixante ans, la jeunesse canadienne a sauvé ce pays. Où sont les jeunes aujourd'hui? Dans l'ensemble, la participation électorale est à la baisse, et celle des électeurs les plus jeunes a chuté de 38,2 % en 1993 à 22,4 % en 2000. Un nouvel électeur sur cinq seulement participe à la détermination de la ligne de conduite de notre pays. D'où vient cette apathie? Comment amener nos jeunes à comprendre le rôle qu'ils ont à jouer pour décider des choix à faire pour l'avenir?

Ces questions, qui me trottaient dans la tête, m'ont amené à penser à la profession d'hygiéniste dentaire. Nous avons dans ce pays un groupe d'hygiénistes dentaires bien branchés et déterminés, qui interviennent très activement dans l'orientation à prendre par la profession. Ces personnes croient en ce qu'elles font, elles en sont fières et sont donc disposées à faire des sacrifices personnels. Bon nombre de

ces chefs de file font progresser l'enseignement de l'hygiène dentaire; beaucoup ont contribué activement à l'avènement de l'autorégulation de la profession dans leur province ou territoire. Quantité d'hygiénistes dentaires dans ce pays qui s'emploient encore à décrocher ce privilège comprennent l'importance de l'autorégulation pour l'avenir de la profession et persèverent dans leurs efforts. Nous devons leur rendre hommage pour leur action passée et présente.

Les hygiénistes dentaires qui travaillent dans une province ou un territoire où l'autorégulation existe depuis bien des années peuvent tenir la chose pour acquise, de la même façon dont nous, Canadiens et Canadiennes, pouvons tenir nos nombreux privilèges pour acquis. Mais il y a encore beaucoup à faire pour la profession, que l'on travaille ou non dans une province ou un territoire où existe déjà l'autorégulation. *Vous*, les jeunes hygiénistes dentaires, vous intéressez-vous de près à votre profession? Quels sont les facteurs qui pourraient causer de l'apathie à l'égard de la profession? Qu'est-ce qui a de l'importance pour vous, en tant qu'hygiénistes dentaires professionnels? Comment pouvons-nous vous amener à faire avancer la profession vers l'avenir? Je vous invite à me faire part de vos réflexions à <saz@cdha.ca> ou au 1-800-267-5235.



Effects of a Community-based Prenatal Nutrition Program on the Oral Health of Aboriginal Preschool Children in Northern Ontario

by Herenia P. Lawrence, DDS, MSc, PhD;* Marilyn Romanetz, RDH;†
Lynn Rutherford, RDH;‡ Lynn Cappel, RDH;§
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ABSTRACT

Background: Aboriginal preschool children across Canada are at increased risk for Early Childhood Caries (ECC) when compared with their non-Aboriginal age cohorts. Current research indicates that dental public health programs fail to prevent ECC because intervention often arrives too late. **Objectives:** To evaluate the effectiveness of the dental hygiene-coordinated prenatal nutrition program, delivered by community-based nutrition educators on First Nations reserves located in the Sioux Lookout Zone (Northwestern Ontario) on: (1) parents/caregivers' beliefs and behavioural decisions related to dental preventive practices and feeding habits of young children; (2) oral health status and treatment needs of those children; (3) early childhood obesity. **Methods:** Cross-sectional oral health surveys of Anishnaabe 2–5 year olds conducted in 2001 and 2002 in 16 communities; 8 communities classified as "high" intervention and 8 as "low" intervention based on frequency of contact and content of contact between nutrition educators and prenatal women. Trained and calibrated dental hygienists examined children for dental caries and oral hygiene and measured height and weight. A questionnaire was used to assess caregiver knowledge, beliefs, and practices in relation to the oral health of the child. **Results:** 471 (72% response) and 705 (65% response) caregiver-and-child pairs participated in 2001 and 2002, respectively. Oral health knowledge in this population was high and significantly higher among caregivers in the high-intervention communities. In high-intervention communities, caregivers brushed children's teeth more frequently and started at an earlier age. Differences in feeding habits were noted with regard to bottle feeding on child's demand and the sugar-rich content of the bottle. Children in high-intervention communities required dental treatment under general anesthetic (GA) but at a later age, were less likely to have abscessed teeth and had less untreated decay by age 4 than those in the low-intervention communities. The program also had significant positive effects on the child's oral hygiene and body mass index (BMI). **Conclusion:** The prenatal nutrition program improved caregivers' knowledge of ECC. However, factors that place undo strain on the caregiver and lead to poor oral hygiene and dietary habits among children in Aboriginal communities need to be addressed. Some strategies to confront these factors are discussed in the paper.

Key words: dental caries; Canadian Aboriginal preschool children; prenatal education; dental hygienist; public health; health promotion; obesity

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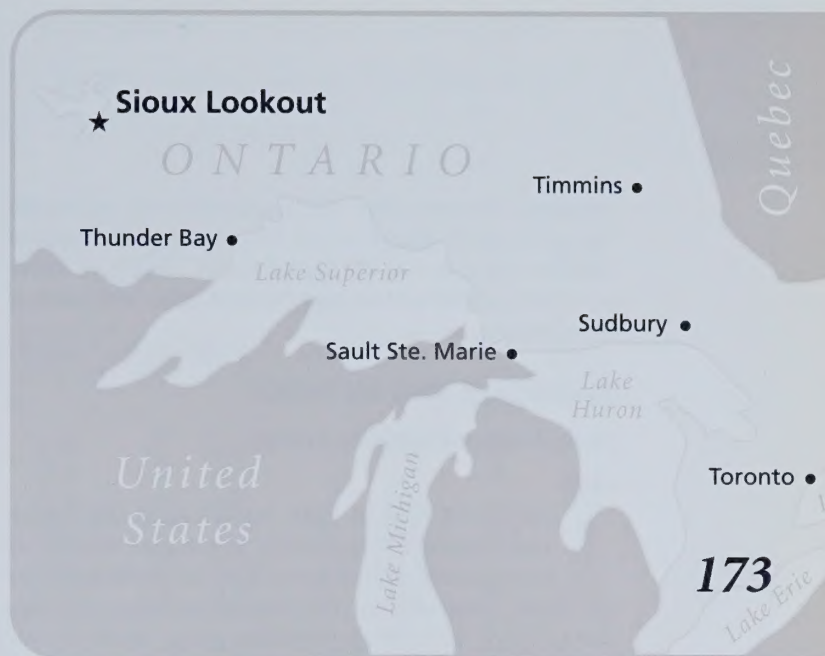
INTRODUCTION

TOOOTH DECAY IN PRIMARY TEETH, KNOWN AS EARLY Childhood Caries (ECC), is currently at epidemic proportions in Canadian Aboriginal children. To date, there has been no national oral health survey of preschool-aged Aboriginal children in Canada; however, oral health data from particular localities indicate a high level of need for dental preventive services for this age cohort. Approximately 70% of Canadian Aboriginal children living on reserves have experienced tooth decay by 3 years of age,^{1,2} and 87% by 5 years,²⁻⁴ with the average dmfs for children aged 4-6 varying between 19 and 24,⁵ and an average dmft of 7 at age 6.⁶

Despite its prevalence, ECC can be prevented through good oral hygiene practices and a well-balanced and nutritious diet. ECC's etiology is largely associated with feeding practices of infants and toddlers and is often referred to as nursing bottle caries. This name highlights the major dietary cause of the disease—the prolonged *ad lib* use of the bottle with sugar-containing liquids, especially at night or nap-time.⁷ However, factors other than bottle feeding have been found to play an important role in the etiology of ECC.⁷ Information from a recent epidemiological study reinforces previous findings that identify race or ethnicity as being associated with early childhood caries.⁸ Other studies focus on the infectious disease model for ECC and show that primary caregivers' oral health status is associated with the oral health of their young children.⁹

Because good oral hygiene practices and healthy eating habits are formed early in life and may be carried into adulthood, prevention programs for ECC that encourage parenting practices related to the dental health of the child should begin in the prenatal and perinatal periods. To be most effective, oral health education should be offered in tandem with programs targeting improved nutrition and decreased risk of other co-morbidities that are highly prevalent among Aboriginal children. For example, First Nations children in Northern Ontario have been reported to have higher prevalence of obesity than non-native Canadian children in the same age group.¹⁰ Diets high in fermentable carbohydrates may increase both obesity and dental caries risk. Using a "common risk factor approach"¹¹ to disease prevention could provide a more effective means to promote the oral health of First Nations and Inuit children in Canada. In addition, the involvement of Canadian Aboriginal peoples in the design and implementation of community-based intervention programs is crucial to their success.¹²

Since the mid-1990s, public health dental hygienists in the Sioux Lookout Zone (SLZ) Dental Program, in partnership with the Sioux Lookout First Nations Health Authority, have been running a community-based dental preventive program for ECC through the help of Woman and Child Community Nutrition Program workers. When the program began, the SLZ, covering an area one-third the size of all Ontario, had a population of 15,000 Ojibway and Cree living in 28 communities. This community-based program was implemented to improve the nutritional status and well-being of prenatal women and their children up to 12 months



postpartum. Most communities in the region have a "woman and child" nutrition educator who is trained annually in Sioux Lookout. During home visits, these health workers provide one-on-one, culturally appropriate, and community-specific nutrition and dental preventive education to pregnant women, new mothers, and elders raising children.

In October 1996 the program began distributing an ECC educational package, "Your Baby's Smile," written in both English and Oji-Cree. This package is given to caregivers 1 to 6 months after the birth of the child. Tippi-cups, toothbrushes, and dental information sheets are given to caregivers when the child is 6 to 12 months old. Other program activities include the following: promotion of healthy food choices by nutrition workers during scheduled food store visits with prenatal women and new mothers; optimal oral hygiene practices taught through the Head Start Brushing Program to toddlers, parents, and guardians; the reinforcement of healthy dental care practices by nursing staff during Well Child Clinics; biannual media campaigns run by dental hygienists and nutrition workers that include public service announcements on radio and the distribution of posters and pamphlets in public areas. More recently, the program was expanded to include smoking cessation sessions for women and the Breakfast for Learning program for children. The latter is supported in part by the Canadian Living Foundation, a national, non-profit organization dedicated to improving the nutrition of children.

This paper presents some of the findings from two oral health surveys of preschool children in the SLZ. The surveys were part of an evaluative study undertaken by investigators from the Faculty of Dentistry at the University of Toronto in 2001 and 2002. This study was to assess the effectiveness of the SLZ prenatal program on parents/primary caregivers' beliefs and their subsequent behavioural decisions related to dental preventive practices and feeding habits of infants and toddlers. Because these behaviours may ultimately affect the prevalence of ECC in these communities, oral health status data were also collected from representative samples of

*Prevention programs for ECC...
should begin in the prenatal and
perinatal periods*

preschool children in the SLZ. Looking beyond oral health issues, the study also measured the impact of the prenatal nutrition program on the prevalence of obesity in native preschool children and its potential association with levels of dental caries.

MATERIALS AND METHODS

Study design and sampling strategy

THE STUDY DESIGN USED BOTH CROSS-SECTIONAL and longitudinal approaches to compare children in communities with different levels of participation in the dental component of the prenatal nutrition program, that is, a high- and a low-intervention group. Levels of community participation in the program were determined by (1) examining quarterly site reports, which summarize the log and tracking sheets of prenatal nutrition workers that document their number of home visits to prenatal women and new mothers and the quality of their interaction with the mother and baby; and (2) monitoring the distribution of ECC educational materials and Tippi-cups. Although the program is delivered universally to all 28 communities on the reserve, high- and low-intervention groups were selected

because the high turnover of local prenatal nutrition workers in some of these communities affected the program's coverage differentially. Thus a cut-off point of 70% or greater for program coverage was set for a "high" intervention community, and a cut-off point of 10% or less was set for "low" intervention communities. A total of 8 communities were classified as "high" intervention and 8 as "low" intervention. The communities in the two groups did not differ in their size or geographical isolation (distance to the main urban centre, Sioux Lookout). The Sioux Lookout Zone communities of Miskeegogamang (Osnaburgh), Weagamow (Round Lake), Frenchman's Head (Lac Seul), Wapekeka (Angling Lake), Bearskin Lake, Pikangikum, Kasabonika Lake, Sandy Lake, Kingfisher Lake, Sachigo Lake, Cat Lake, Wunnumin Lake, Poplar Hill, Deer Lake, Webequie, and Summer Beaver were contacted and all agreed to participate in the study but requested that the results not be presented by community in any reports or publications that grew out of the study. We agreed to this stipulation and it was decided that the health director and the chief of each community would receive a confidential report of the findings upon completion of our study. Scientific and ethical approval from the University of Toronto, the Sioux Lookout Zone Hospital Research Ethics Review Committee, and Sioux Lookout Zone Tribal Councils were obtained before the start of the study.

Band lists were used to identify children born in June 1996 up to February 1999. This age range was chosen because the program was targeted at prenatal women and was fully launched in mid-1996, so children aged 2 to 4½ at the begin-

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Table 1. Response rates by survey year, study group, and reasons for non-response

Communities' level of exposure to the program ^a	Yr 2001		Yr 2002	
	High	Low	High	Low
Total age-eligible	344	309	585	493
Respondents (%)	230 (66.9)	241 (78.0)	367 (62.7)	338 (68.6)
Complete clinical examination (%)	224 (65.1)	236 (76.4)	365 (62.4)	334 (67.7)
Key sibling for questionnaire (%)	215	217	182	158
Follow-up questionnaire (%)	—	—	156	152
Non-respondents (%)	114 (33.1)	68 (22.0)	218 (37.3)	155 (31.4)
Reasons for non-response (%)				
- Could not be contacted	35 (10.2)	37 (12.0)	78 (13.3)	58 (11.8)
- Refusal (too far, too busy, parent at work)	8 (2.3)	10 (3.2)	5 (0.8)	16 (3.2)
- Child is sick	7 (2.0)	2 (0.6)	2 (0.3)	5 (1.0)
- Relocation	25 (7.3)	10 (3.2)	89 (15.2)	29 (5.9)
- Child is deceased	1 (0.3)	0 (0.0)	2 (0.3)	4 (0.8)
- Unknown	38 (11.0)	9 (2.9)	42 (7.2)	43 (8.7)
Participants				
2001 only (n = 134)	60	74		
2002 only (n = 369)			198	171
2001 and 2002 ^b (n = 336)			169	167

^a Sioux Lookout Zone Prenatal Nutrition Program for the prevention of early childhood caries (ECC): High = 8 out of 28 randomly selected communities with $\geq 70\%$ distribution of program's oral health promotion materials during home visits to prenatal women and new mothers. Low = 8 out of 28 randomly selected communities with $\leq 10\%$ distribution of program's oral health promotion materials during home visits to prenatal women and new mothers.

^b Longitudinal data available but not shown.

ning of 2001 would be eligible. A total of 471 out of 653 age-eligible children participated in the 2001 oral health survey after parental informed consent was obtained in writing (72% response rate). In 2002, a new cohort of 2-year-old children were added to the study and the original cohort of 2-to-4-year-olds were re-examined and re-interviewed. A total of 705 out of 1078 (65% response rate) 2-to-5-year-old children (born between March 1999 and April 2000) participated. Out of those 705 caregiver-and-child pairs, complete oral health status data were compiled for 699 preschoolers (Table 1). Age-eligible siblings were examined but the caregiver's questionnaire was filled out only for the youngest child per caregiver in both 2001 and 2002 surveys. This is because it was observed that when the questionnaire was pilot tested, mothers were more likely to recall the feeding and oral hygiene practices of their youngest child as opposed to those for older children.

Clinical examinations of preschool Aboriginal children on reserves

Four teams of calibrated dental hygienists and recorders were flown into the participating communities for an average stay of 3 to 7 days to carry out the oral examinations and interviews. All examinations and most interviews were conducted at Health Canada's nursing stations assisted by community translators and dental assistants. A few caregiver interviews were conducted at either the child's home or over the telephone. Recruitment strategies included local radio broadcasting to promote the project and remind caregivers of their children's appointment.

Examiner calibration sessions in the use of the caries diagnostic criteria of the National Institute of Dental Research (NIDR)¹³ were performed with 8–10 children over a 1½-day period in the Sioux Lookout Zone Dental Department (Sioux Lookout, ON) immediately before the two waves of data collection began. Dental hygienists were calibrated against a gold-standard dentist examiner in the use of the dmft/s indices using plane mouth mirrors. The explorer was used as a tool to remove plaque and debris and check the surface characteristics of suspected carious lesions. Carious lesions were recorded either at the non-cavitated (d_1) or the cavitated (d_3) visual level of dentinal involvement, and abscessed teeth were referred for urgent treatment. The Debris Index (DI)¹⁴ was used to measure soft deposits on the labial surfaces of incisors or a substitute tooth before the tooth surfaces were examined for decay. Radiographs were not used. Kappa values for inter-examiner agreement ranged from 0.6 to 0.8 in both survey years. The study adopted the National Institute of Dental and Craniofacial Research's (NIDCR) ECC case definition.¹⁵

Caregiver survey of knowledge, beliefs, attitudes, and practices in relation to child oral health

In 2001, each child's primary caregiver was asked to complete a behavioural questionnaire developed specifically for this study and pilot tested on a sample of mothers of young children in SLZ communities. The questionnaire assessed the following: the child's dental history and dental care utilization pattern (including having dental treatment under general anesthesia in the SLZ Hospital); the child's general health, birth history, oral hygiene practices, and feeding his-

Table 2. Percent distribution of First Nations children by communities' level of exposure^a to the prenatal nutrition program and important characteristics of the child, mother/primary caregiver, and household in the 2001 and 2002 Oral Health Surveys of Preschool Children in the Sioux Lookout Zone, Ontario

Communities' level of exposure to the program ^a	Yr 2001		Yr 2002 (new participants)	
	High n=230 %	Low n=241 %	High n=198 %	Low n=171 %
Child's characteristics				
Male	51.7	51.5	49.5	56.7
Age (yrs)				
2	37.0	38.6	60.6	68.7
3	47.8	44.0	22.2	17.5
4	15.2	17.4	12.1	11.7
5	N/A	N/A	5.1	2.3
Birth order	(n=215)	(n=217)	(n=182)	(n=158)
Youngest child ^b	63.9	59.8	55.7	48.5
Born prematurely (<37 wks)	17.0	13.7	10.7	12.2
Low birthweight (<2,500 grams)	4.7	3.8	1.1	4.6
Use of sweetened medications for >1 wk	64.0	70.0	71.2	71.3
Caregiver's rating of child's general health				
Excellent/very good/good	92.1	94.5	89.6	93.0
Fair/poor/very poor	7.9	5.5	10.4	7.0
Caregiver's rating of child's oral/dental health				
Are you satisfied with the way your child's teeth look?				
Very much (Excellent)	8.0	15.2	14.3	10.2
They look OK (Good)	37.3	29.0	30.2	45.9
Not much (Some problems)	38.2	35.2	36.3	31.8
Not at all (Not satisfied)	16.5	20.5	19.2	12.1
	$\chi^2 = 8.03, p = 0.045$		$\chi^2 = 9.81, p = 0.020$	
Birthmother's characteristics				
Age group				
≤ 20 years of age	7.3	6.4	11.6	8.4
> 20 to < 25 years	38.2	30.3	38.1	39.7
25 years and older	54.5	63.3	50.3	51.9
Educational level				
Less than high school	76.5	82.4	82.1	82.4
High school completed (Grade 12)	11.7	10.6	11.5	10.7
More than high school education	11.7	6.9	6.4	6.9
Primary caregiver's characteristics (birthmother included)				
Relationship to child				
Birthmother	83.7	88.5	86.3	82.9
Father	5.6	7.4	5.5	10.1
Foster/step/adopted mother	3.3	1.4	4.4	1.9
Grandparent	6.0	2.8	3.8	3.2
Other relative	1.4	0.0	0.0	1.9
Do you have your own natural teeth?				
Yes, most of my own teeth	N/A	N/A	91.1	74.7
Yes, I have a few of my own teeth	N/A	N/A	6.1	20.3
No, I have dentures/false teeth	N/A	N/A	2.2	3.8
No, I have no natural or false teeth	N/A	N/A	0.6	1.3
	$\chi^2 = 17.1, p = 0.001$			

continued...

Communities' level of exposure to the program ^a	Yr 2001		Yr 2002 (new participants)	
	High n=230 %	Low n=241 %	High n=198 %	Low n=171 %
When do you usually go to the dentist/dental hygienist?				
Regularly	32.7	30.0	41.5	25.2
Only when in pain	44.9	51.6	43.2	55.5
Never or rarely	22.4	18.3	15.3	19.4
			$\chi^2 = 9.8, p = 0.007$	
Household characteristics				
Number of children living in the home				
Mean $\pm$ std. error	2.8 $\pm$ 0.10	3.6 $\pm$ 0.14	2.8 $\pm$ 0.11	3.5 $\pm$ 0.18
Mann-Whitney <i>U</i> test	$p < 0.001$		$p = 0.011$	
Number of adults (including the child's caregiver) living in the home				
Mean $\pm$ std. error	2.3 $\pm$ 0.07	2.6 $\pm$ 0.10	2.4 $\pm$ 0.08	2.6 $\pm$ 0.13

N/A = Not applicable or 'not asked' in the 2001 Oral Health Survey.

^a High = 8 out of 28 randomly selected communities with $\geq 70\%$ distribution of program's oral health promotion materials during home visits to prenatal women and new mothers. Low = 8 out of 28 randomly selected communities with $\leq 10\%$ distribution of program's oral health promotion materials during home visits to prenatal women and new mothers.

^b Key sibling for questionnaire, that is, the questionnaire was completed for the youngest child in each family.

N.B.: When *p*-values are not reported, the results are not statistically significant. This applies to all tables.

tory; the caregiver's socio-demographics, source of information regarding oral health issues, awareness of, and participation in, the components of the prenatal nutrition program; and the caregiver's oral health knowledge, beliefs, and attitudes in relation to ECC. Questionnaire items were based on a review of the literature and were adapted to reflect the content of the dental component of the prenatal nutrition program. The purpose of the pilot testing of the questionnaire was to check for face and content validity, that is, whether the instrument appears culturally appropriate for the intended purpose. Pilot testing resulted in several items being reworded and a question on the caregiver's income being deleted.

The questionnaire was used again in 2002 with the new participants in the study ($n=369$). In addition, a separate, similar caregiver's questionnaire was designed to detect changes since the previous year's interview and was applied to a subset of caregiver-and-child pairs who were followed for 1 year ($n=336$, data not presented). It also included sections on the caregiver's readiness to adopt oral health preventive behaviours, maternal depression, smoking status, pregnancy complications, oral health perception, dental status, pattern of dental services use, and perceived impact of ECC on the daily activities of the child and the family.

Other measures

The child's medical history and birthweight were confirmed through chart reviews at the nursing stations. The child's age, sex, current weight and height, from which the Body Mass Index ($BMI = wt \text{ in kg/ht in m}^2$) was calculated, were recorded by the examiner. In children and teens, the BMI is used to assess underweight, overweight, and risk for being overweight. The BMI for children, referred to as BMI-for-age, is also gender and age specific.^{16,17} The BMI-for-age was plotted on gender-specific 2000 Center for Disease Control's (CDC) growth charts.¹⁸ Children were categorized based on

percentile values of BMI-for-age (cut-off points: ≥ 95 th percentile, ≥ 85 th– <95 th percentile, ≥ 5 th– <85 th percentile, and <5 th percentile) to identify those who were underweight and those who were overweight.

Timeline of activities

Pilot testing of the caregiver questionnaire took place in November and December 2000 in Lac Seul and Osnaburgh. The first examiner calibration session was held in early February 2001 in Sioux Lookout, followed immediately by subject enrolment, baseline clinical examinations and interviews until the end of March 2001. Data entry and preliminary analyses, collection of program costs, and interviews of "key players" for purpose of process evaluation happened midway between the two cycles of data collection. The second-year training and calibration of examiners, immediately followed by data collection, started in February 2002 when the cycle of activities repeated itself. The project findings were presented annually at local and scientific meetings and at the Nishnawbe Aski Nation Health Conference held in November 2002.

Data analysis

Data analysis consisted of bivariate statistics to determine significant differences between the study groups (*i.e.*, child and caregiver from the high- or low-intervention communities) in terms of the caregiver's responses to survey questions or the child's clinical examination findings. The chi-squared test was used for differences in proportions. The two independent-samples *t* test was used for the comparison of means. If the distribution of continuous variables was skewed, the Mann Whitney *U* test was used instead of the *t* test. This was the case for dmft data that were skewed to higher values. The association between BMI-for-age categories and dmft index scores was analyzed using the Kruskal-Wallis test. All analyses were stratified by oral health

Table 3. Impact of the prenatal nutrition program on parent/caregiver's knowledge, beliefs, and attitudes in relation to infants' oral health: frequency rating (%) for each item in the oral health knowledge assessments and total scores for the parents/caregivers enrolled in the 2001 and 2002 (new participants) Oral Health Surveys of Preschool Children in the Sioux Lookout Zone, Ontario

Statement	% AGREE ^a 2001 High ^b n=215	% AGREE 2001 Low n=217	% AGREE 2002 High n=182	% AGREE 2002 Low n=158
1. Baby teeth are important even though they fall out.	82.3	72.3	88.9	88.0
2. Problems with baby teeth will affect adult teeth.	50.9	52.1	55.2	43.7
3. Tooth decay (rotten teeth) could affect my child's health.	78.4	76.4	75.7	69.6
4. A baby's mouth should be cleaned before the first baby tooth is in the mouth.	86.0	81.9	85.6	91.0
5. Brushing my child's teeth with fluoride toothpaste will help prevent tooth decay.	83.3	76.4	85.1	83.5
6. Baby teeth are developed before the baby is born.	48.1	33.0	43.1	29.1
7. My diet during pregnancy will affect my baby's teeth.	32.4	24.8	30.4	29.3
8. It's a good idea to give my baby a bottle to comfort him/her while teething.	17.2	21.0	18.9	24.2
9. Frequently feeding my child sweetened liquids, such as pop and fruit juice, is bad for his/her teeth.	94.9	90.6	92.8	89.9
10. Frequently feeding my child milk or formula is bad for his/her teeth.	23.0	24.2	27.6	35.4
11. As my baby gets older and can hold a bottle easily, he/she can have a bottle whenever he/she wants.	21.6	34.1	29.4	40.8
12. It's okay to let my child nurse in bed with me all night. ^c	14.0 ^c	9.8 ^c	25.6	29.1
13. It's okay to put my child to bed with a bottle. ^c	14.0 ^c	9.8 ^c	14.9	19.1
14. Bottle-feeding after my child is 1-year-old is bad for his/her teeth.	79.9	76.1	67.4	73.4
Total Score (ranges: 0–13 in 2001 & 0–14 in 2002; higher scores are indicative of increased knowledge) Mean $\pm$ std. error	8.62 ^d $\pm$ 0.14	7.73 $\pm$ 0.18	9.07 ^e $\pm$ 0.18	8.55 $\pm$ 0.20

^a Respondents were given the options to agree/disagree with the statement or check "don't know."

^b High = 8 out of 28 randomly selected communities with $\geq 70\%$ distribution of program's oral health promotion materials.

Low = 8 out of 28 randomly selected communities with $\leq 10\%$ distribution of program's oral health promotion materials.

^c Statements 12 and 13 formed a single item in the 2001 oral health survey.

^d $p < 0.001$ (t-test); ^e $p < 0.05$ (t-test)

survey year, 2001 and 2002. The cross-sectional data reported in this paper are just for child-and-caregiver pairs who participated in 2001 or in 2002, not in both years. Oral health status data are presented, stratified by the child's age. Since most of the new participants enrolled in 2002 were under 3 years of age, clinical exam data are reported for 2-year-olds only in the 2002 oral health survey. Statistical tests were two-tailed and interpreted at the 5% level using the SPSS statistical software (Version 11.0) for data analysis.

RESULTS

THANKS TO THE STRONG PARTNERSHIP THAT WAS forged between the public health dental hygienists coordinating the study and their communities, there were high response rates for an epidemiological study of this

nature, both in the first- and second-year oral health surveys (Table 1). The rates and reasons for non-response did not differ significantly between the two study groups and were mainly the result of not being able to contact the caregiver during the time the research team was on the reserve.

The study groups had balanced sex and age distributions in the oral health surveys in 2001 and 2002 (Table 2). In 2002, the majority of the new enrollees were aged 2. Most primary caregivers were the birth mothers, who rated their satisfaction with their child's teeth significantly poorer in the low-intervention communities in 2001. However, the caregivers of the new participants in these communities in 2002 were generally more satisfied with the way their child's teeth looked than those in the high-intervention communities. Based on self-reporting, it appears that the caregivers in the low-intervention communities had a poorer oral health sta-

Table 4. Impact of the prenatal nutrition program on parenting behaviours related to child preventive oral health practices and dental care utilization: results from the 2001 and 2002 Oral Health Surveys of Preschool Children in the Sioux Lookout Zone, Ontario

Communities' level of exposure to the program ^a	Yr 2001		Yr 2002 (new participants)	
	High n=215 %	Low n=217 %	High n=182 %	Low n=158 %
Child's oral hygiene and other caries preventive practices				
<i>How often do you, or someone else in your family, clean your child's teeth?</i>				
Never	3.3	7.9	1.6	12.7
A few times per month	10.7	16.2	7.1	8.9
Once a week	12.6	10.2	13.7	7.0
A few times per week	24.3	19.4	26.9	24.1
Once a day	22.9	26.4	30.8	22.2
Two or more times per day	26.2	19.9	19.8	25.3
	χ^2 test, $p = 0.062$ (NS)		$\chi^2 = 22.9$, $p < 0.001$	
<i>What do you use to clean your child's teeth?</i>	(n=207)	(n=200)	(n=179)	(n=138)
Toothbrush	97.1	98.0	90.5	97.1
Washcloth/tender/gauze sponge	2.9	2.0	1.7	1.4
Dental floss or other	0.0	0.0	7.9	1.4
<i>At what age did you or someone else in your family, start to clean your child's teeth?</i>				
Mean $\pm$ std. error (months)	12.1 $\pm$ 0.63	13.0 $\pm$ 0.67	10.4 $\pm$ 0.54	12.7 $\pm$ 0.74
Mann-Whitney U test				$p = 0.006$
<i>Toothpaste use</i>	93.7	95.0	90.0	96.4
Child's dental care utilization				
<i>Has your child ever been to a dentist/dental hygienist?</i>				
Yes	58.4	56.2	55.8	40.1
			$\chi^2 = 8.27$, $p = 0.004$	
<i>At what age was your child's <u>first</u> dental visit?</i>	(n=125)	(n=122)	(n=101)	(n=63)
Before age one	11.8	5.1	2.0	3.4
Age 1 to 2	73.9	72.0	79.2	71.2
Age 3 to 4	14.3	22.9	18.8	25.4
	χ^2 test, $p = 0.063$ (NS)			
<i>What was the reason for your child's <u>first</u> dental visit?</i>				
Regular check-up	50.0	32.8	33.3	28.6
Toothache/dental pain	18.0	27.2	14.7	19.0
Cavities/rotten teeth	N/A	N/A	22.5	30.2
Concern about appearance of teeth/gums	18.8	26.4	8.8	4.8
Facial swelling/abscess/infection	1.6	4.0	4.9	9.5
Trauma/accident/injury	1.6	1.6	9.8	3.2
Other	10.2	8.0	5.9	4.8

^a High = 8 out of 28 randomly selected communities with $\geq 70\%$ distribution of oral health promotion materials.

Low = 8 out of 28 randomly selected communities with $\leq 10\%$ distribution of oral health promotion materials.

N/A = category 'not asked' in the 2001 Oral Health Survey.

NS = not statistically significant at the 5% level but significant at the 6% level.

tus and lived with more children in the home than those in the high-intervention communities.

The prenatal program had a significant impact on the caregiver's knowledge, beliefs, and attitudes in relation to their infant's oral health (Table 3). Specifically, caregivers in communities where program coverage was high scored significantly better on the dental knowledge assessment. The questionnaire items that showed differences between the

high and low groups were related to intra-uterine tooth formation, the impact of the prenatal diet on the baby's teeth, and bottle-feeding to "comfort the baby while teething" or "to be used whenever the baby is old enough to hold the bottle."

According to the responses from the caregivers' survey, a greater proportion of parents or caregivers in the high-intervention communities reported cleaning their child's teeth at a higher frequency, and starting at an earlier age, as compared

Table 5. Impact of the prenatal nutrition program on parenting behaviours related to breast- and bottle-feeding practices: results from the 2001 and 2002 Oral Health Surveys of Preschool Children in the Sioux Lookout Zone, Ontario

Communities' level of exposure to the program ^a	Yr 2001		Yr 2002 (new participants)	
	High n=215 %	Low n=217 %	High n=182 %	Low n=158 %
Breastfeeding practices				
<i>Did or do you breastfeed your child?</i> Yes	71.6	74.0	74.2	77.2
<i>If yes, how long was/has your child breastfed?</i> Mean $\pm$ std. error (months)	(n=154) 15.4 $\pm$ 1.14	(n=160) 13.6 $\pm$ 1.07	(n=135) 14.8 $\pm$ 1.02	(n=122) 13.1 $\pm$ 1.01
<i>At what age did you wean your child from breastfeeding?</i> Mean $\pm$ std. error (months) Still breastfeeding child (%)	12.6 $\pm$ 1.00 16.8	10.1 $\pm$ 0.88 26.9	8.5 $\pm$ 0.83 22.2	7.68 $\pm$ 0.79 20.8
$\chi^2 = 4.69, p = 0.030$				
Bottle-feeding practices				
<i>Did you ever bottle-feed your child?</i> Yes	78.4	86.0	80.1	88.6
$\chi^2 = 4.19, p = 0.041$ $\chi^2 = 4.55, p = 0.033$				
<i>At what age did you start bottle-feeding your child?</i> Mean $\pm$ std. error (months)	(n=169) 5.0 $\pm$ 0.54	(n=186) 5.7 $\pm$ 0.51	(n=145) 5.1 $\pm$ 0.59	(n=140) 6.2 $\pm$ 0.58
<i>Other than for meals, when did/do you give your baby a bottle?</i>				
<u>Nap time:</u> Never	7.3	15.2	11.7	7.9
Sometimes	43.3	49.7	49.0	52.9
Always	49.4	35.2	39.3	39.3
$\chi^2 = 9.16, p = 0.010$				
<u>Bed time:</u> Never	7.2	13.3	11.7	12.2
Sometimes	28.1	36.7	29.7	33.8
Always	64.7	50.0	58.6	54.0
$\chi^2 = 8.03, p = 0.018$				
<u>Child crying:</u> Never	16.7	15.1	14.5	13.8
Sometimes	50.0	52.3	69.7	55.1
Always	33.3	32.6	15.9	31.2
$\chi^2 = 9.52, p = 0.009$				
<i>On average, how often does the child walk around with a bottle to sip from during the day?</i>				
Never	N/A		23.3	27.9
Sometimes			58.2	48.6
Often			16.4	15.0
All the time			2.1	8.6
$\chi^2 = 7.71, p = 0.052$				
<i>If the child uses a bottle, what is <u>most often</u> contained in the bottle?</i>				
Cow's milk	N/A		28.1	14.3
Condensed milk (for example, Carnation milk)			23.3	48.6
Formula			25.3	18.6
Plain water			2.1	2.1
Sweetened water/tea			8.2	7.1
Soft drinks (for example, pop)			0.7	0.7
Fruit juice			12.3	8.6
$\chi^2 = 24.7, p = 0.001$				
<i>Do you add sugar or sweeteners to your child's bottle?</i> Yes	N/A		34.5	55.4
$\chi^2 = 12.6, p < 0.001$				

continued...

Communities' level of exposure to the program ^a	Yr 2001		Yr 2002 (new participants)	
	High n=215 %	Low n=217 %	High n=182 %	Low n=158 %
At what age did you stop giving your child a bottle? Mean $\pm$ std. error (months) Continue to bottle-feed (%)	22.5 $\pm$ 1.00 52.4	21.8 $\pm$ 1.03 51.4	20.5 $\pm$ 1.17 53.8	22.3 $\pm$ 1.23 61.9
Tippi-cup use				
Is the child using a Tippi-cup now? Yes	N/A	N/A	53.3 (n=97)	55.1 (n=87)
At what age did the child <u>start</u> to use the Tippi-cup? Mean $\pm$ std. error (months) Mann-Whitney U test	N/A	N/A	13.9 $\pm$ 0.58 p = 0.048	15.7 $\pm$ 0.70
Child continues to use a Tippi-cup (%)	N/A	N/A	91.5	87.0

^a High = 8 out of 28 randomly selected communities with $\geq 70\%$ distribution of oral health promotion materials.

Low = 8 out of 28 randomly selected communities with $\leq 10\%$ distribution of oral health promotion materials.

N/A = item or response category 'not asked' in the 2001 Oral Health Survey or in the 2002 Oral Survey.

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with those in the low-intervention communities. These results reached statistical significance in the 2002 survey sample (Table 4). Over half of the parents reported that the child had seen a dentist or a dental hygienist in the past, with the majority of children being seen for the first time between the ages of 1 and 2 years. An increased proportion of children were seen by a dentist or dental hygienist for reasons related to tooth or mouth problems in the low-intervention communities than in the high, but this difference was not statistically significant (Table 4).

Overall, children in the SLZ communities were breastfed for more than 12 months, and a higher proportion of caregivers in the low-intervention communities were still breastfeeding in 2001 (Table 5). Contrary to expectations, the bottle was used at naptime and bedtime more often by children in the high- versus the low-intervention communities in 2001. Conversely, in 2002, a greater proportion of caregivers in the low-intervention communities were "always" giving the child the bottle when she/he cried for it outside mealtime. In addition, children in the low-intervention communities

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Table 6. Impact of the prenatal nutrition program on caregiver nutrition choices with respect to their children: results from the 2001 and 2002 Oral Health Surveys of Preschool Children in the Sioux Lookout Zone, Ontario

Communities' level of exposure to the program ^a	Yr 2001		Yr 2002 (new participants)	
	High n=215 %	Low n=217 %	High n=182 %	Low n=158 %
Sugary snacks per day				
Fewer than 2	4.7	4.7	N/A	
At least 2	95.3	95.3		
<i>Whose advice did/do you follow when making decisions on what to feed your child?</i>				
Child's grandparents or other relative	N/A		37.6	33.5
Nutrition educator			3.3	1.3
Doctor or health worker			9.9	7.0
Spouse			3.9	1.9
Friend			1.7	1.9
Other			0.0	1.9
"No one, I figured it out myself"			43.6	52.5
<i>The choices you make when feeding your child are dependent on...</i>				
Child's demands	N/A		35.4	41.6
Available time			19.9	12.1
Limited variety of groceries available			17.7	16.1
Cost of food			10.5	6.0
Child's health			11.6	15.4
Other			5.0	8.7
<i>Do/did you ever chew the child's food before giving it to the child?</i>				
Yes	33.3	44.0	53.6	51.9
	$\chi^2 = 3.67, p = 0.054$			
<i>Do/did you and your child share the same spoons and forks, or cups and bottles, during feeding time?</i>				
Yes	31.6	34.0	37.6	40.8
<i>Did/does your child use a sweetened soother, for example, a pacifier dipped in sugar/honey?</i>				
Yes	1.9	4.2	N/A	N/A

^a High = 8 out of 28 randomly selected communities with $\geq 70\%$ distribution of oral health promotion materials.

Low = 8 out of 28 randomly selected communities with $\leq 10\%$ distribution of oral health promotion materials.

N/A = item or response category 'not asked' in the 2001 Oral Health Survey or in the 2002 Oral Survey.

were more likely to walk around with a bottle to sip from during the day, most often containing cariogenic liquids such as Carnation milk or sugar/sweeteners added to the contents of the bottle. The Tippi-cup was introduced later for children in the low-intervention communities, but approximately half of the caregivers in both groups continued to use the bottle after the Tippi-cups were provided.

Daily consumption of sugary snacks was widespread in all communities, whereas the habit of dipping the pacifier in sugar or honey was not common (Table 6). Caregivers reported getting information from a grandparent or another relative about feeding their child, but mostly they "figured it out by themselves." Interestingly, the majority of caregivers participating in 2002 reported that the choices they make when feeding their child depended on the child's demand. Finally, a significantly lower proportion of parents in the high-intervention communities in 2001 reported the habit of chewing the child's food before giving it to the child. This is possibly the result of the program's oral health education messages that warn against the practice.

Despite significant effects of the program on the oral health-related knowledge, beliefs, and practices of the caregiver, dental caries experience remained very high in the SLZ communities (Table 7). For example, using the proposed case definition of ECC by the National Institute of Dental and Craniofacial Research (NIDCR), over 90% of children were classified as cases, regardless of whether they were in the high- or low-intervention communities. The NIDCR definition classifies a child under 71 months with 1 or more dmf surfaces, non-cavitated or cavitated, as having ECC.¹⁵ However, a significantly higher proportion of 2-year-olds in 2001 required dental care under general anesthesia at the Zone Hospital if they resided in low-intervention areas. However, rates of dental treatment under general anesthesia increased progressively with age regardless of study group and were slightly increased for new 2-year-olds in the 2002 survey. The guideline for hospital-based care was deemed as treatment required in 3 to 4 quadrants of the mouth in children at least 2½ years old if all 20 primary teeth had erupted. Treatment under general anesthetic consisted of extractions

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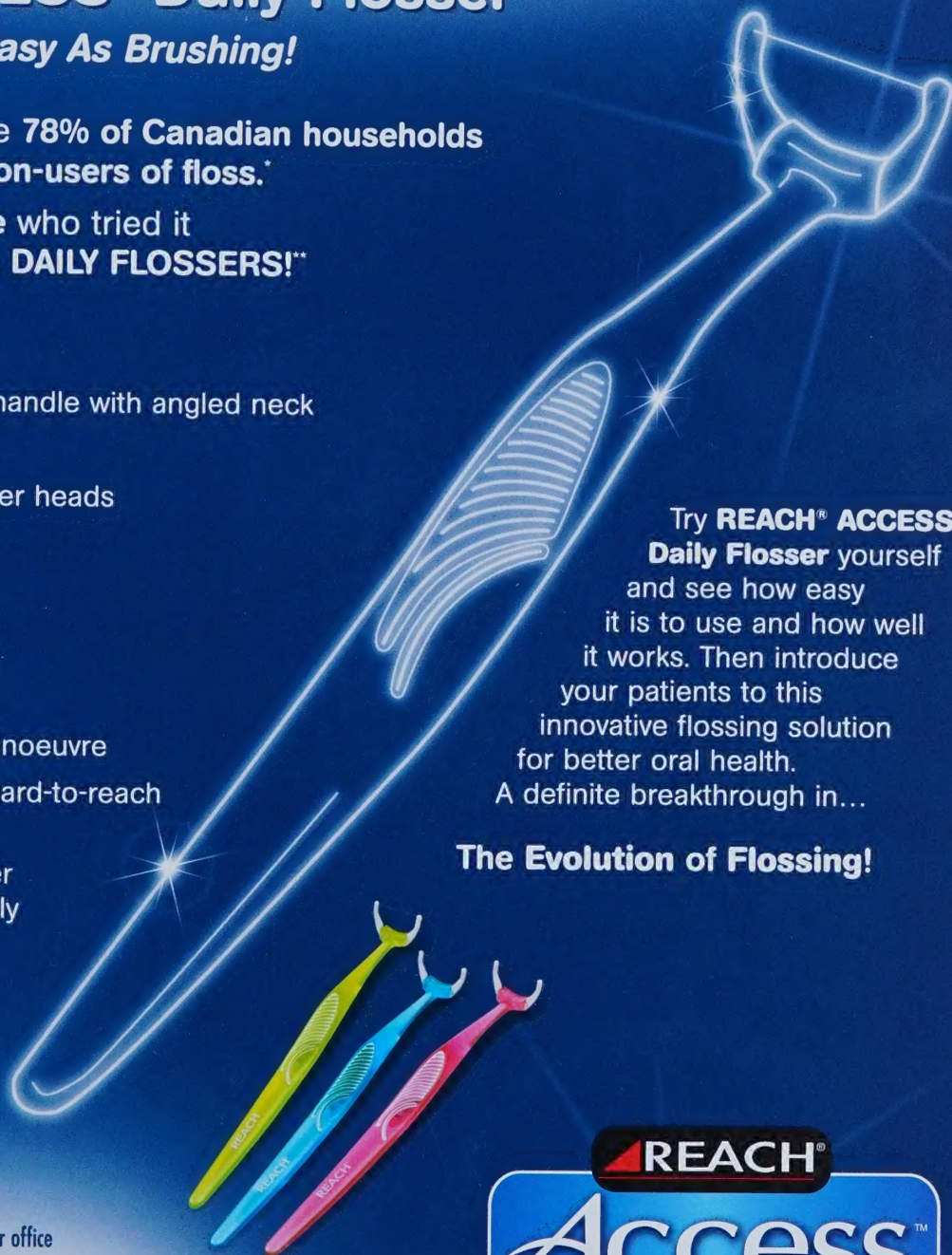
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Table 7. Dental care under general anesthesia (GA) and caries prevalence in 2-4 year-old, First Nations children in the Sioux Lookout Zone, Ontario by oral health survey year and communities' level of exposure to the prenatal nutrition program^a

	Yr 2001 2-yr-olds		3-yr-olds		4-yr-olds		Yr 2002 New 2-yr-olds	
	High n=82	Low n=89	High n=108	Low n=105	High n=34	Low n=42	High n=120	Low n=117
Percentage who had a dental GA	6.1	15.7*	32.4	29.5	62.9	45.2	15.3	12.3
Percentage with decayed tooth (d _{3t}) ^b								
0	8.5	13.5	14.8	9.5	20.6	11.9	12.7	11.8
1-3	6.1	13.5	10.2	5.7	23.5	16.7	14.4	15.5
4+	85.4	73.0	75.0	84.8	55.9	71.4	72.9	72.7
Percentage with 1+ abscessed tooth	6.1	1.1	3.7	12.4*	0.0	9.5	4.2	8.5
Percentage with teeth missing due to caries								
0	92.7	80.9	65.7	64.8	32.4	50.0	80.5	85.5
1-3	1.2	4.5	3.7	7.6	8.8	7.1	4.2	1.8
4	4.9	12.4	10.2	13.3	17.6	19.0	11.9	11.8
>4	1.2	2.2	20.4	14.3	41.2	23.8	3.4	0.9
Percentage missing maxillary incisors/canines due to caries	6.1	13.5	29.6	26.7	55.9	42.9	18.6	14.5
Percentage with 1+ stainless steel crowns	1.2	1.1	24.1	15.2	47.1	26.2	1.7	0.9
Mean d _{1-3s} ^b	26.5	19.8**	22.0	29.3**	15.7	25.2**	15.9	17.2
Standard Error	2.0	1.6	1.8	1.8	2.7	3.2	1.2	1.3
Mean d _{3mft} (w/o SSC) ^b	10.2	8.0**	10.2	12.2**	10.0	10.9	7.8	7.3
Standard Error	0.6	0.5	0.4	0.4	0.9	0.7	0.5	0.5
Mean % d ₃ /(d _{3mft} w/ SSC)	96.1	90.4	73.6	81.2	49.1	67.8**	91.0	92.6
Standard Error	3.2	3.7	3.8	3.1	6.9	5.6	1.8	1.9
Percentage soft debris covering > 1/2 labial surface of tooth 61 or 21 and/or 81 or 41	37.0	54.5*	42.6	51.9	29.4	42.9	46.7	62.9*

^a High = 8 out of 28 randomly selected communities with ≥70% distribution of oral health promotion materials during home visits to prenatal women and new mothers.

Low = 8 out of 28 randomly selected communities with ≤10% distribution of oral health promotion materials during home visits to prenatal women and new mothers.

^b d₃ = cavitated carious lesion. d₁ = non-cavitated carious lesion. Unless otherwise stated, the d_{3mft} index does not include stainless steel crowns.

p* < 0.05, chi-squared test, *p* < 0.05, Mann-Whitney *U* test.

of severely affected teeth and the prophylactic placement of stainless steel crowns on deciduous canines and molars. As a result of treatment, the rates of missing teeth and stainless steel crowns increased with age and occurred independently of program activities. The beneficial caries-inhibiting effect of the program was observed on rates of abscessed teeth for 3-year-olds and on carious teeth and surfaces for 3- and 4-year-old children. Most of the dmft index in these children was composed of untreated caries compared with children living in communities with high exposure to the prenatal program. A higher proportion of children aged 2 in 2001 had less debris/plaque but a higher mean number of decayed surfaces and a higher mean d_{3mft} if they resided in communities with high exposure to the prenatal program. This may be the result of the confounding effect of treatment that started earlier in the low-intervention communities in the 2001 sample. These effects were not observed for the new 2-year-old subjects in 2002, except that oral hygiene was improved in the high-intervention communities.

Data presented in Table 8 indicate that the nutrition program targeted at prenatal women and their infants decreased

the risk for preschool obesity in the Aboriginal population. A higher proportion of preschool children were classified as "overweight" in the low-intervention group than in the high-intervention group in the 2002 oral health survey. There was no significant difference in mean d_{3mft} values between groups categorized by BMI-for-age.

DISCUSSION

THE CARIES PREVALENCE FOUND IN THE preschool Aboriginal Canadians in this study is among the highest reported for this age cohort. In 1973 and 1983, studies assessed the caries experience in children 5 years and older in Sioux Lookout Zone communities.^{19,20} Comparing the caries rates in 4-year-old children in the present investigation to those investigated in 1973 and 1983 suggests that caries rates have increased over the years. This temporal change in caries prevalence has also been reported in Apache American preschool children.²¹ However, the level of treatment received by this age group was greater in 2001–2002 than that provided in 1973 and 1983.

Approximately one-third of the subjects had undergone a dental procedure under general anesthesia in 2001.

Treating ECC has proved costly due to geographical barriers that make access to dental care difficult in these isolated Northern communities and often require children and caregivers to be flown to the Sioux Lookout Zone Hospital for treatment under general anesthesia. Currently, access to dental practitioners and dental hygienists is provided under the Non-Insured Health Benefits (NIHB) Program of the Medical Services Branch of Health Canada. The mean total treatment cost per general-anesthesia case in the SLZ Hospital was estimated at CAD\$2,642.50. The total cost to Health Canada for dental services for this age group was nearly half a million dollars in 2001.

By itself, access to dental care cannot eliminate the burden of dental caries. Ismail *et al.*'s study found that the disparities in caries prevalence among 6- and 7-year-old children in Nova Scotia at different socio-economic levels have not been eliminated even though children had been given access to publicly financed dental insurance programs since birth.²² Rather, the authors concluded that a multifactorial approach is needed to address family and community determinants of oral health.²² Our study found that broad-based programs that focus on both the child and the caregiver and that have the support of community health workers and nutritionists can produce positive outcomes. Acting as the first line of defence, the public health dental hygienist can play an important role in developing early preventive care programs that combat ECC and reduce the need for treatments under general anesthesia and in turn reduce medical care costs. The cost of ECC treatment is, in itself, sufficient reason for policy makers and other health professionals to dedicate both time and money to promote the oral health of this vulnerable pediatric population and to direct more attention to the health disparities between native and non-native children.

This community-based prenatal intervention conducted by dental hygienists and nutrition educators was found to be effective in improving children's oral hygiene and in reducing the number of children needing emergency care for

The caries prevalence found in the preschool Aboriginal Canadians in this study is among the highest reported for this age cohort

abscessed teeth. It has not, at present, reduced the number of referrals for general anesthesia. The effect of the program on dental caries and pain reduction in preschool-aged children was only evidenced for 3-year-olds because at this age, most Aboriginal children have all of their primary teeth, are more independent, and their eating habits appear to worsen. By age 4, dental treatment started to reduce the untreated caries rates for both high- and low-intervention groups. Thus more intensive preventive interventions for 2- to 4-year-old children are needed to augment the existing prenatal/new mothers nutrition program. ECC preventive programs aimed at toddlers would ensure that any inroads made in the first year of life would be continued in the formative years when calcification of children's teeth is taking place. Such interventions also must be developed with full participation of the Aboriginal communities, as ownership of the program by these communities will undoubtedly enhance sustainability and future success. After all, we need to keep in mind that health promotion is "the process of enabling people to increase control over, and to improve, their health."²³

Despite the limitation of cross-sectional study designs to demonstrate causal relationships, the study showed that more caregivers who lived in high-intervention communities adopted child-feeding practices that prevent ECC than in the low-intervention communities. In particular, risk factors associated with the development of this disease—introducing tooth cleaning habits at an older age and the inappropriate use of the baby bottle upon a child's demand—are common to other high-risk child populations in Canada and the United States.²⁴⁻²⁸ Interestingly, however, naptime and bedtime use of the bottle were behaviours that continued in the high-intervention communities. This sug-

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Table 8. Impact of the prenatal nutrition program in the Sioux Lookout Zone on percentile 'BMI-for-age'^a category distribution for 2- to 5-year-old children by oral health survey year. Mean number of cavitated decayed, missing or filled primary teeth (d₃mft) according to BMI category

Communities' level of exposure to the program ^b	Yr 2001				Yr 2002 (new participants)			
	High n=230		Low n=241		High n=198		Low n=171	
Percentile BMI-for-age ^a	%	d ₃ mft	%	d ₃ mft	%	d ₃ mft	%	d ₃ mft
<5 th (underweight)	6.6	8.8	7.2	9.1	3.5	10.3	2.9	6.4
≥5 th to <85 th	57.0	10.9	51.1	9.7	54.5	8.1	40.6	8.8
≥85 th to <95 th (at risk of overweight)	16.2	10.5	21.1	11.2	16.2	9.0	24.7	8.2
≥95 th (overweight)	20.2	8.4	20.7	11.2	25.8	8.6	31.8	8.5
$\chi^2 = 9.534, p = 0.023^c$								

^a Body Mass Index, or BMI = wt (kg) / ht² (m²). BMI for children, also referred to as BMI-for-age, is gender and age specific.^{16,17} BMI-for-age is plotted on gender-specific 2000 CDC Growth Charts.¹⁸

^b High = 8 out of 28 randomly selected communities with ≥70% distribution of program's oral health promotion materials during home visits to prenatal women and new mothers. Low = 8 out of 28 randomly selected communities with ≤10% distribution of program's oral health promotion materials during home visits to prenatal women and new mothers.

^c P-value for the differences in the proportion of children by BMI-for-age category versus the communities' level of exposure to the program. The differences between the mean dmft for 2- to 5-year-old subjects among the BMI-for-age categories were not statistically significant (Kruskal-Wallis, $p > 0.05$).

Treating ECC has proved costly due to geographical barriers that make access to dental care difficult

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gests that using the bottle to help babies fall asleep might be culturally acceptable and/or a way that young or single-parent families from poor socio-economic and educational backgrounds might cope with one of the stresses of child-rearing. In addition, the surveys in 2002 included questions related to the oral health status of the primary caregiver and showed that caregivers in the low-intervention communities have significantly poorer self-reported oral health, visit the dentist less often, and had more children living in the home than those in the high-intervention communities. Thus a strategy directed at improving the caregivers' own oral health knowledge and related health behaviours may be an important element in the prevention of caries in their children, particularly when this strategy is paired with other programs directed at improving the living conditions and educational opportunities of teens and young adults living in Aboriginal communities.

We believe the partial success of the program might be the result of the way that the transfer of knowledge takes place during home visits from health care workers. The prenatal women/caregivers surveyed in the high-intervention group appear to have responded well to peer counseling from the health workers in the SLZ. During home visits, prenatal women are instructed on the importance of healthy infant nutrition in the prevention of chronic diseases, such as diabetes and early childhood caries. The community health workers convey these messages using visual aids contained in binders that explain the various diseases that children are prone to and the means to prevent those diseases. For example, the dental binder includes pictures of ECC and culturally appropriate messages regarding child-feeding practices, notably the proper use of baby bottles. During follow-up home visits to new mothers, community nutrition workers assess whether mothers have adopted the behaviours explained at the initial home visit. The health workers use a checklist to record the mother's responses and to determine if deficiencies exist with regards to following the advice given in the binders. Once deficiencies have been determined, health workers then focus on these areas during subsequent visits.

It has long been recognized that educational interventions alone have only a limited capacity to achieve long-term sustained changes in individual behaviours.²⁹ However, research has demonstrated that patterns of behaviour learned during early childhood, such as tooth brushing habits, become accepted routines throughout one's life.³⁰ One of the goals of the dental component of the Prenatal Nutrition Program in the SLZ is the formation of good health habits in the young rather than behaviour modification later. Community health workers are in a unique position to give dental preventive advice to pregnant and nursing mothers.³¹ In Canada and the United States, successful oral health promotion programs for Aboriginal populations have been implemented and showed an overall decrease in the

prevalence of ECC.³²⁻³⁴ These programs attempted to decrease the social acceptance of prolonged bottle-feeding by tailoring the intervention to the cultural beliefs of the community so as to make people more receptive to behavioural change. The SLZ Prenatal Nutrition Program for the prevention of ECC was founded on this theoretical basis and sees oral health promotion as integral to the health of the child, the family, and the community.

Additionally, community health workers can also be trained in the use of behavioural management skills to motivate parents/caregivers to change their child-rearing practices with respect to dental care. One such technique is Motivational Interviewing (MI),³⁵ which has been used effectively to deter adolescent smoking.³⁶ During MI, the treatment goals, negotiated between the client and the health care worker, are flexible and attainable within the client's current skill level. MI also takes into account the constraints on, and opportunities for, change that shape the everyday lives of individuals. It has been suggested that parents/caregivers are often reluctant to alter their child-rearing behaviours, especially if those behaviours are used to lessen the stress of bigger problems in the home (alcoholism, spousal abuse, overcrowding). Thus a recent measure to introduce stages of change (as with smoking cessation programs) or "readiness" for changing parenting practices related to children's dental health have been recommended for use in high caries risk populations.³⁷

Because the SLZ dental component of the prenatal program also recognized the importance of sound nutritional practices, it was hypothesized at the beginning of our study that an effect would also be found on preschool-aged children's obesity rates. Accordingly, the prenatal nutrition program did have a positive impact on the prevalence of overweight children in the 2002 survey, but no relationship was found between BMI and caries levels in this preschool population, a finding similar to that of Chen *et al.*³⁸ among 3-year-old Chinese children. When compared with the prevalence of obesity in American Indian communities, these Canadian preschoolers had a higher prevalence rate for being overweight. From data summarized in Story *et al.*,³⁹ the prevalence rate of overweight (BMI > 85th percentile) in Alaska Natives aged 0-4 years participating in public health programs was 11%, while approximately 12% of American Indian preschool children in Arizona were above the 95th percentile in weight-for-height. These children had higher mean age-adjusted BMIs than white, black, or Hispanic preschoolers. Like ECC, the etiology of obesity is multifactorial; both genetics and environment are clearly determinants. Of relevance to dental public health, both ECC and children's obesity share behavioural and lifestyle decisions that parents make related to children's diet, such as overconsumption of sugary snacks.

An alternative nutrition health promotion strategy currently being considered in the SLZ is the development of the school curriculum to include nutrition, dental health, and a course on parenting skills for teenagers that will highlight dental health of infants. Attempts to increase awareness of ECC and the importance of good nutritional habits could be further enhanced in these communities through mass media oral health education campaigns and Breakfast for Learning

Helen Bishop MacDonald, RD, MSc, FDC
For Dairy Farmers of Canada



WEIGHTY ISSUES



Because dairy calcium encourages the body to use fat as fuel, it helps overweight, dieting individuals to lose weight and body fat.

The deleterious impact of obesity on human health is far from a new issue. But since the World Health Organization made their startling prediction that fatness is poised to overtake smoking as our number one killer,¹ it has taken on a great deal more weight, if you'll pardon the pun. It seems you can't pick up a paper without seeing something new on the subject. While the beneficial impact of calcium, particularly in dairy products, on weight reduction isn't exactly news, it's gaining a lot of credibility as time—and more research—goes on. Epidemiological studies such as CARDIA^{2*} and the Quebec Family Study,³ among others, have reported an inverse relationship between dairy products and calcium intake, and body weight and body fat in both adults²⁻⁶ and children.^{7,8} The mechanism, validated by animal studies,⁹ is complex, but simply put: a high-calcium diet encourages the body to use fat as fuel, whereas a low-calcium diet encourages fat storage.⁶

Most recently, in a randomized, double-blind, placebo-controlled study, Zemel and colleagues showed that dairy

calcium accelerates weight loss and fat reduction in obese adults (n=32) following a weight-loss diet, with substantially greater effect than supplemental calcium.⁶ Moreover, both the calorie-restricted, high-dairy and high-calcium diets produced striking and statistically significant changes in the distribution of body fat loss, particularly in the trunk region, the fat deposition area most commonly associated with high cardiovascular risk (see Table).⁶ To emphasize the importance of waist circumference vis-a-vis body weight: new research shows that normal-weight adults with the same waist circumference as overweight adults have comparable health risks.¹⁰

While calorie restriction is a very important component of weight loss in adults, in children it appears that increased calcium results in reduced body fat and body weight even when caloric intake is constant.⁸

Of course, the other important variable in weight loss, regardless of age, is exercise. According to current public health recommendations, we should strive for a daily total of 30 minutes of moderately intense exercise. However, this amount may be insufficient to prevent unhealthy weight gain for some people who—due to genetics or behavioural determinants—may require additional exercise or calorie restriction in order to prevent weight gain.¹¹ In addition to aerobic exercise, resistance training and flexibility exercises practiced at least twice weekly are also recommended for the maintenance of lean body mass as well as improved strength and endurance.¹¹

Effects of dietary treatments on body weight and body fat⁷

Parameter	Low Calcium [†]		High Calcium [‡]		High Dairy [§]	
Weight change (kg and % of initial weight)	6.6 kg	6%	8.6 kg	9%	11.1 kg	11%
Fat change (kg)	4.8 kg		5.6 kg		7.2 kg	
Trunk fat change (kg)	1.4 kg		2.9 kg		3.7 kg	

[†] 480 mg calcium (≤ one serving milk products)

[‡] 1,256 mg calcium (diet & supplement)

[§] 1,137 mg calcium (3 servings of milk products)

* CARDIA = Coronary Artery Risk Development in Young Adults

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Our study found that broad-based programs that focus on both the child and the caregiver and that have the support of community health workers and nutritionists can produce positive outcome

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Programs that work to prevent diabetes and obesity. However, the habits influencing ECC risk factors are complex and longstanding, often reinforced by culture, customs, and continual commercial advertising promoting unhealthy choices. When the public health dental hygienist designs oral health promotion programs for Aboriginal populations, it is necessary to recognize that "making healthy choices easier choices" is pivotal to the success of any prevention program.⁴⁰ This may entail going beyond asking parents to simply adopt healthy lifestyle behaviours to more drastic measures that require the assistance of provincial or local government, such as increasing the availability of lower priced fresh fruits and vegetables, as well as fresh milk rather than canned condensed milk (that has a high sugar content) in these remote communities.

CONCLUSIONS

THE SLZ COMMUNITY-BASED PRENATAL NUTRITION program improved caregivers' knowledge of ECC and oral health preventive practices. However, more needs to be done to address the factors that place undo strain on parents/caregivers and that lead to poor oral hygiene and dietary habits among children in Aboriginal communities. The program was found to be effective in reducing the number of decayed surfaces but not, at present, in reducing the number of referrals for general anesthesia. It also had significant positive effects on the child's oral hygiene and BMI. We believe that oral health education should continue to be part of prenatal and early childhood education and be offered in tandem with programs targeting improved nutrition and decreased risk of obesity. As this study has shown, dental hygienists can play a significant role in co-ordinating local oral health preventive programs and in evaluating the success or failure of those programs. To be most effective, interventions must be developed with the full participation of at-risk communities and with the support of partnerships established within those communities. In the SLZ, dental hygienists already play a very significant role in these partnerships, acting as liaisons among various groups within the community. We hope that the suggestions noted above can assist dental hygienists in promoting the oral health of all at-risk child populations and assist in reducing the oral health disparities between Aboriginal and non-Aboriginal children living in North America.

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* Based on a 90-day practice-based brand-identified monadic evaluation of Sonicare Elite with 900 hygienists and 1700 patients.

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FROM THE EDITOR

A new look, a new name...

by Patricia Buchanan, Editor

The late 1960s saw the birth of CDHA's professional journal, *The Canadian Dental Hygienist / L'hygi  niste dentaire du Canada*. On its 20th anniversary, it was redesigned and became what you will all recognize—*Probe*. Now, as we approach CDHA's 40th birthday, we are updating the journal once again to keep pace with the changes that have occurred over the past years. The September/October 2004 issue will have a new look and a new name—the *Canadian Journal of Dental Hygiene / Journal canadien de l'hygi  ne dentaire*.

First of all, the name... "*Probe*" has served us well but it is time for a name that reflects our renewed focus on scientific research and its applicability to clinical dental hygiene practice. The new name is descriptive, unique, makes the focus of the journal immediately apparent, and places the publication in the tradition of the other international dental hygiene journals.

Along with the name change, we are becoming a "one-format" journal, eliminating the division of issues into scientific and classic categories. From now on, each bi-monthly issue will be a blend of research or evidence-based articles, clinical practice articles, literature reviews, case studies, as well as our regular columns, news, and classified ads. Moving to one format will not only provide a greater variety of reading material in each issue, it will also speed up the whole publication process. Authors of research papers will welcome not having to wait for room in scientific issues (published only twice a year) and seeing their work presented in a timely fashion.

Thanks are due to an ad hoc group who last fall looked at the redesign proposal and gave it an enthusiastic response, complete with many valuable suggestions. With their experienced input and knowledge of CDHA and the journal, we are taking this step to make the journal even more useful and valuable to our members.

Our aims for this new journal are to promote research and evidence-based practice; retain and increase our readers' interest, academics and clinicians alike; and of course, satisfy everyone most of the time!

Your feedback is most welcome and encouraged—I look forward to hearing from you. I can be reached at peb@cdha.ca or 1-800-267-5235.

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Proud partner of the Canadian Dental Hygienists Association, Meloche Monnex offers its congratulations on their 40th Anniversary.

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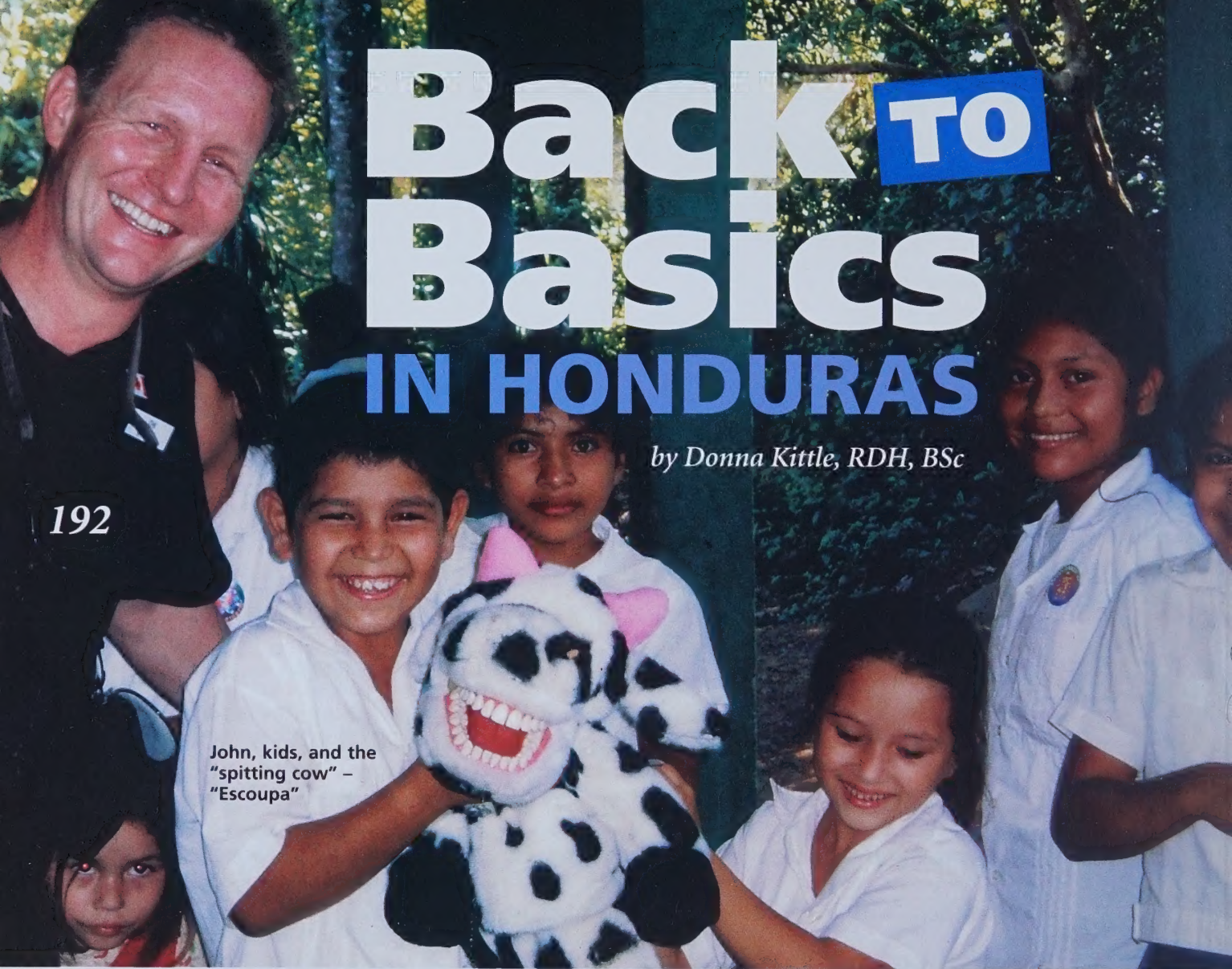


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Where insurance is a science
...and service, an art

A man with a beard and a black t-shirt is smiling on the left. Several children in white school uniforms are gathered around him. One child in the center holds a large, black and white spotted stuffed cow with a wide, toothy mouth and pink ears.

Back **TO** Basics IN HONDURAS

by Donna Kittle, RDH, BSc

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John, kids, and the
"spitting cow" –
"Escoupa"



Lennie, our local dentist,
supervising our "professors"
as they teach the younger
children

No duele, no duele!" shouted the pint-sized five-year old. She basically took charge and directed the huge lineup of very nervous grade ones. One group was sent for very basic toothbrush instruction and the other for the application of fluoride varnishes for caries prevention. Finally, after 11 years of "yank 'em and fill 'em" dental missions, the Kindness in Action (KIA) was beginning a preventive dental health pilot program.

KIA is an Alberta non-profit service club consisting of dental professionals and other non-dental volunteers from across Canada and the United States. This non-partisan group is motivated by the belief in the dignity of all people and their right to basic human needs. With a desire to help those in the developing world, KIA has organized humanitarian missions in Central America since 1993. Funding comes from service clubs grants (the Lions and Rotary clubs), private fundraising, and donations in kind and service. The average cost for sponsoring a volunteer per project is approximately \$1,600 for a one-week mission. The budget for each dental mission is approximately \$8,000 and includes the rental of a bus and driver, repair and maintenance of equipment, gauze, anesthetic, toothbrushes, etc.

KIA has grown in the past 12 years from a challenge over a cup of tea at the kitchen table to 230 volunteers participating in 14 different dental mission locations in 7 different countries (Honduras, Guatemala, Peru, Nicaragua, Mexico, Belize, and Thailand) in 2004. Final statistics for this year: 5,978 patients treated; 5,841 extractions; 2,493 fillings; 1,000 cleanings; 781 fluoride varnishes; 11 root canals; 49 dentures; and 1 school built!

With our four volunteers, we started our public health program by returning to the schools the day after our clinic. It was quite amazing to be greeted by a whole school of running children. "The spitting cow was a huge hit," said John Wittnebel, veteran KIA go-fer volunteer (go for this, go for that) with Group I Honduras. "The kids would laugh and holler 'Escoupa, escoupa.'" The large cow hand-puppet was a member of the Dr. Brian Palmer family. With a huge smile of teeth, the puppet helped the four volunteers with the brush-ins. When the small pump was squeezed, the cow spit water across to the crowd of on-lookers. Using laughter, smiles, and charades, the team of four KIA volunteers taught much-needed very basic brushing techniques to three school districts in Northern Honduras. At school #1, we had only 2½ hours to brush, fluoride, and varnish 70 kids' teeth before the pick-up truck came to collect us.

"I've never had to really use my basic hygiene skills for prevention as I did here," said Carla Browning, first-time dental hygiene volunteer with Group I Honduras. "The day before at our clinic, I suddenly realized, when child after child looked weird at the toothbrush I gave them, that some have never seen a toothbrush, let alone been taught how to use one properly." The generalized very thick soft plaque was the evidence seen on almost every child that a toothbrush had not even come in contact with their teeth, even by accident. "From one adult patient in the clinic, I even scaled off a dead fruit fly from under the heavy calculus!" said Browning. "It is our basic human responsibility to help our fellow man. For me, the most rewarding part was teaching tooth-brushing

and counting to ten in Spanish, English, or French. I felt truly needed and I accomplished something of great importance in the big picture. At home I get paid, but I definitely don't get the same job satisfaction."

One of KIA's aims is to plant the seeds for self-sufficiency. Our school group consisted of two hygienists, one go-fer, and one local dentist from San Pedro Sula who was hired as a translator. At first she did not really understand why we should waste our time with the children. But over the three days, she came to understand why we were carrying out this program. At the end, she was truly involved in discussing snacks and nutrition with the kids and has volunteered to go back to each village and re-apply the fluoride varnish to the children in the three schools. Perhaps next year, we can have a teach-in for the mothers regarding basic nutrition for their children; candies, Pepsi, and sugar cane are not on that list.

"I'm not as wasteful now, and I appreciate what I have," said 15-year-old Jamie Morrissey, first-time go-fer with Group I Honduras. "Going on one of the dental missions is a real life-changing experience.... At first, I was sad to see how the people lived...but then coming back and seeing my life at home and at school was a real shock."

Canadian dental hygienists are involved in developing the program for community public health. Kim Penner, RDH, has been instrumental in developing a manual to be used in our program for school and community development. The seeds are being planted and soon the blossoms will appear: a self-sufficient, dentally aware, and almost pain-free world!

For further information, visit our web-site at <www.kindnessinaction.ca>, or contact Dr. Amil Shapka at <docdoc1@hotmail.com>. 🌐

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With a professional membership in the Canadian Dental Hygienists Association, everything you need to help you give your clients the care they deserve is right at your fingertips.

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THE CANADIAN DENTAL
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Summertime, and the living is easy . . .

...except for those who are hard at work on CDHA's 2004-2005 membership drive! We've turned up the heat this year as we prepare to celebrate our association's 40th birthday. Not only are we working to enhance member benefits with new products and services, but we are also giving away prizes throughout the year as a way to say thank you to our members.

Want to get in on the fun? Then keep an eye on your mailbox and make sure you complete and return your membership renewal forms — only those who renew will be eligible to take part in the prize draws!

Exceptional opportunities, more ways to stay connected — we want to make your decision to renew an easy one so we are constantly looking for ways to enhance the benefits of membership in the CDHA.

We've got you covered

As an Active member of CDHA, you get (at *no extra charge*):

- **Liability (Malpractice) Insurance** — you are covered for up to \$3 million in damages; and
- **Disciplinary/Sexual Abuse Defence-Cost Insurance** — this covers civil litigation costs relating to disciplinary matters and claims related to sexual abuse.

This coverage is *absolutely free* and included as a benefit of your Active membership. On top of this, CDHA members are able to purchase members-only group insurance, coverage designed specifically for dental hygienists.

We'll keep you connected

Everything you need to help you give your clients the care they deserve is right at your fingertips. Need to learn about new products, find another CDHA member or get the very latest in research findings or practice standards? You can do it all by simply visiting the members-only section of our web site.

No need to work in the dark

From email bulletins and online resources such as career listings, research articles and practice standards, to the *Canadian Journal of Dental Hygiene* (formerly *Probe* — please see the announcement elsewhere in this issue), dental hygiene's only national professional journal, you get the information you need to stay informed.

But remember, these benefits are available to *members only*.

Renewal Dates for Regulatory Bodies

Alberta:	November 1, 2004
Newfoundland:	November 30, 2004
Nova Scotia:	November 30, 2004
New Brunswick:	January 1, 2005
Ontario:	January 1, 2005
Manitoba:	January 15, 2005
Saskatchewan:	January 15, 2005
British Columbia:	March 1, 2005
Prince Edward Island:	April 1, 2005
Quebec:	April 1, 2005

Membership drive starts soon

Very shortly, a personalized membership-renewal package will be sent to you unless you practise in Alberta and Saskatchewan. (Membership renewals in Alberta and Saskatchewan are administered through the regulatory bodies. Please contact Saskatchewan Dental Hygienists Association at 306-931-7342 or the Alberta Dental Hygienists Association at 780-465-1756 for more information on membership renewal in your province.)

To ensure you receive your package with the least possible delay, please make sure the CDHA has your current mailing address. You may check this by logging on to the members-only section of our web site at www.cdha.ca. There, you can check your personal file and make changes, if necessary. If you do not have Internet access, the CDHA membership team would be pleased to assist you. Simply call us toll-free at 1-800-267-5235, Monday to Friday, 8:30 a.m. to 5 p.m. (ET).

Renew online!

It's easy, it's fast and it's *completely secure*. As of September 1, 2004, you will be able to visit us on the web at www.cdha.ca to complete and pay for your membership renewal.

You can also renew by regular post at any time, of course. Bear in mind, however, that because we are processing several thousand membership forms over a few short weeks, if you mail your renewal forms, you should allow four to six weeks for your membership renewal to be processed *after* we receive your completed forms.

Once your renewal forms have been processed, you will be sent a membership package that contains an acknowledgement letter, your membership card, your insurance certificate and a tax receipt.

Important note to members in Nova Scotia and

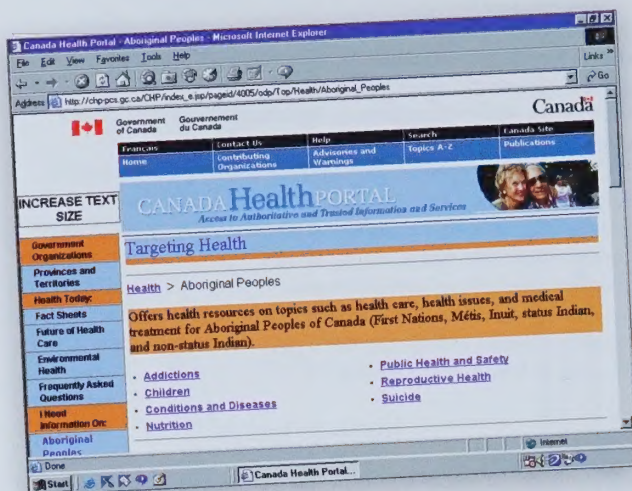
Newfoundland: The membership renewal processing timeline is especially important for you because membership is mandatory for practicing dental hygienists in your province. Your registrars require proof of membership by November 30, 2004, so please do not delay in sending us your membership renewal.

"... stay involved, stay connected . . ."

When Mai Pohlak took the reins of CDHA 40 years ago as our organization's first president, she and her colleagues set us on a path of solidarity, a path that would see the development of preventive oral health care in Canada, a path that would result in improved overall health for millions of Canadians.

In an interview in the July/August 2003 edition of *Probe*, Ms. Pohlak continued to encourage leadership in Canadian dental hygiene, suggesting that hygienists "stay involved" and "stay connected."

As the only national association for dental hygiene in Canada, CDHA represents the voice and vision of more than 14,000 dental hygienists in Canada and is dedicated to advancing the profession and protecting the interests of all its members. As a member of CDHA, you are an important partner in the dental hygiene community; you are part of the collective voice and vision of dental hygiene in Canada. So, get those renewal forms in early and stay connected! 🐾



First Nations and Inuit Dental Health. Report of House of Commons Committee

www.parl.gc.ca/InfoComDoc/37/2/HEAL/Studies/Reports/healrp05/healrp05-e.pdf

This report of the Standing Committee on Health, published in June 2003, examines the Non-Insured Health Benefits Dental Program, issues such as "Promotion and Prevention," "Dental Care," and "Client Consent." It ends with five strong recommendations to the government concerning an effective and accountable oral health strategy, collaboration with First Nations and Inuit clients, improved access to comprehensive dental care, improved access to dental care providers, and client consent.

Canada Health Portal — Aboriginal Peoples

http://chp-pcs.gc.ca/CHP/index_e.jsp/pageid/4005/odp/Top/Health/Aboriginal_Peoples

A portal site, this site provides information and links in a variety of categories: Addictions, Children, Conditions and diseases, Nutrition, Public health and safety. Here you can find information about the Non-Insured Health Benefits program that has been much in the public eye lately.

Institute of Aboriginal Peoples' Health (IAPH), Canadian Institutes of Health Research

www.cihr-irsc.gc.ca/e/institutes/iaph/8668.shtml

This institute supports research to address the special health needs of Canada's Aboriginal people. Some of the areas of research include the following: identification of health advantage and health risk factors related to the cultural, social, psychological, physical, genetic environments; disease, injury and disability prevention strategies; clinical trials or other methodologies to determine the most effective interventions to address a variety of health needs; health services research to address the unique accessibility and provider issues such as funding and continuity of care and with particular regard to issues of child and elder care.

Low Birth Weight Babies and Oral Health (National Institute of Dental and Craniofacial Research)

www.nidcr.nih.gov/health/newsandhealth/periodontal/Pregnancy.asp

This has a link to the article "The Oral-Systemic Health Connection" from NIDCR's publication *Spectrum*. It examines the links between oral disease and such diseases/conditions as diabetes, heart disease, preterm low birth weight babies, AIDS.

Health Canada's Canadian Guide to Clinical Preventive Health Care

www.hc-sc.gc.ca/hppb/healthcare/pubs/clinical_preventive/index.html

Under the topic Prenatal and Perinatal Preventive Care is a chapter on "Prevention of Low Birth Weight/Preterm Birth." Under Dental Preventive Care are chapters on "Prevention of Dental Caries" and "Prevention of Periodontal Disease."

Canadian Association of Public Health Dentistry (CAPHD)

www.caphd-acsd.org/articles1.html

This section of CAPHD contains many interesting articles and one that is particularly apt for this issue of *Probe*, "Oral disorders, systemic health, wellbeing and the quality of life – A summary of recent research evidence" by Dr. David Locker and Dr. David Matear of the Community Health Services Research Unit, Faculty of Dentistry, University of Toronto. This was published a couple of years ago but still has a wealth of interesting information.

CDC WONDER

(Centers for Disease Control and Prevention)

<http://wonder.cdc.gov/>

This "easy-to-use, menu-driven system that makes the information resources of the Centers for Disease Control and Prevention (CDC) available to public health professionals and the public at large." It provides access to a wide array of public health information. With CDC WONDER, you can:

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- Query numeric data sets on CDC's mainframe and other computers, via "fill-in-the blank" web pages. Public-use data sets about mortality (deaths), cancer incidence, HIV and AIDS, behavioral risk factors, diabetes, natality (births), census data and many other topics are available for query, and the requested data are readily summarized and analyzed.

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1. Harris M, Mackay H, *et al.*, Effectiveness of Johnson & Johnson REACH® Clean Burst™ vs. GLIDE® Mint Floss in Reducing Plaque, *Journal of Dental Research*, Vol. 82, Special Issue 8, June 2003.
2. Harris M, Hardie-Muncy D, *et al.*, Effectiveness of Johnson & Johnson REACH® Clean Burst™ vs. Oral-B® SATIN FLOSS™ in Reducing Plaque, Data on file, Johnson & Johnson Inc., 2003.

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FORT ST. JOHN Busy family practice requires F/T hygienist for July. Fort St. John is a rapidly growing community with all the amenities of a large town while still having the small town community spirit. The city offers a new aquatic centre, sports and arts facilities, and the great outdoors at your doorstep. Flexible with hours and a very competitive wage. Fax résumé to 250-785-0625 or call 250-785-1867 (days) for more information.

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CDHA CLASSIFIED ADS

Classified job ads are posted on CDHA's web site (www.cdha.ca) in the Career Centre (*Members' Only* section). Complimentary ads will also be published, at no cost to the advertiser, in the issue of *Probe* that follows submission of the ad. These complimentary ads should be no longer than 70 words and are inserted in the order of submission to a maximum of one page. These ads reach over 10,000 CDHA members across Canada, ensuring that your message gets to the target audience promptly. Contact CDHA for more information at 613-224-5515 or at info@cdha.ca.

COLD LAKE Our long-established family practice is currently looking for a compassionate registered dental hygienist with excellent communication skills to join our Hygiene Dept. This is a full-time position, available July. The comprehensive nature of our progressive office makes this a perfect opportunity for experienced hygienists or conscientious new grads. If you are looking for a great team, please contact Tri-Town Dental, Box 1710, Cold Lake, AB T9M 1P4 Tel: 780-594-5984; fax: 780-594-5965.

ROCKY MOUNTAIN HOUSE LOCATION, LOCATION, LOCATION!! If you are looking for a change, Rocky Mountain House has it all. Our staggered 4-day work week provides alternating 2- and 4-day week-ends, a perfect blend of work and time for yourself. We offer very competitive wages and benefits. This permanent full-time position will complement our friendly staff of 10. Call us!!! Contact Ruth at 403-845-3111 or fax your résumé to 403-845-7610.

SASKATCHEWAN

MELFORT If you want the lifestyle of a small town, with the advantage of being 1½ hours from a major airport, close to breathtaking lake country, our very busy, progressive office requires a full-time dental hygienist. New building, new equipment, great staff, competitive salary. Don't let this opportunity pass you by. Please send résumé to Melfort Dental Group, Attn: R. Carlson, Box 3129, Melfort, SK, S0E 1A0. Or fax it to 306-752-5994.

ONTARIO

CALEDON EAST Dental hygienist required for Tuesdays (alternating evenings) in Caledon East, located one-half hour north of Toronto airport. Please phone 905-584-9355 or fax 905-584-9375.

NEWMARKET Dental hygienist needed for maternity leave, starting September 6, 2004 to September 2005; Monday 12-8:30, Wednesday 12-8:00, Thursday 8-4. We are a family practice located in Newmarket in a lovely century home. We are looking for a multi-tasking/flexible person to join our team. This could lead to a permanent position. Please fax your résumé to 905-836-8249 or email it to drbriancroppo@rogers.com.

WALLACEBURG Restorative dental hygienist required full-time starting in July, in a busy, progressive dental office in Wallaceburg, ON. Fax résumé to 519-627-7321.

NOVA SCOTIA

ANNAPOLIS ROYAL Energetic and hardworking RDH needed for busy family practice in the historic town of Annapolis Royal, N.S. Our work week is Monday to Thursday with the option of working in our second office on Friday. Salary will be based on experience. A one-year commitment is required. Fax résumés to 902-765-6043.

NEWFOUNDLAND

BAY ROBERTS Full-time registered dental hygienist required immediately. Well-established general dentistry practice in Bay Roberts, Newfoundland, requires a full-time dental hygienist to begin immediately. Our office is 45 minutes from St. John's. Large patient base with a variety of oral hygiene needs. We are looking for an enthusiastic, hardworking individual. Please fax or e-mail résumé to: Bay Roberts Dental Health Centre, Attn: Dr. Michelle Zwicker, 709-786-0895 or mdzwicker@nf.sympatico.ca.

INTERNATIONAL

GERMANY Are you interested in working as a Dental Hygienist in Germany? Positions for one year or more. I can arrange dental hygiene placements with excellent salary, benefits, and an apartment. Please contact MCDent, Elke Mehrfeld at e-mail: info@mcdent.net; tel: 0049-172-8 06 77 77; fax: 0049-711-2 73 87 88.

AGENCIES

PERIOCONCEPTS PLLC International dental hygiene positions. We offer several positions for dental hygienists interested in working abroad. Dental practices are thoroughly screened with most profiles listed on our web site at www.perioconcepts.com. Become an active client by sending us the following: professional résumé, letter of recommendation, and a recent photo. Contact Heidi Glastetter, RDH: PerioConcepts PLLC, The International Dental Placement Service, 6903 Fauntleroy S.W., Seattle, Washington 98136 U.S.A. Tel: 001.206.923.2221; fax: 001.206.923.2225; e-mail: perioheidi@yahoo.com.

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